

LilyPond

The music typesetter

Internals Reference

The LilyPond development team

This manual is a technical reference for all internal elements used by LilyPond and all Scheme functions it provides. This information can be used to create tweaks and extensions, from simple output settings to advanced Scheme programming.

This copy of the Internals Reference identifies function parameters (see Chapter 4 [Scheme functions], page 796) only by positional names: *a*, *b*, *c*, . . .

For meaningful parameter names, generate bytecode before generating the documentation.

For more information about how this manual fits with the other documentation, or to read this manual in other formats, see Section “Manuals” in *General Information*.

If you are missing any manuals, the complete documentation can be found at <https://lilypond.org/>.

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For LilyPond version 2.24.4

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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: absolute-dynamic-event (page 48), dynamic-event (page 51), music-event (page 53), and StreamEvent (page 57).

Accepted by: Dynamic_engraver (page 420), and Dynamic_performer (page 421).

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 AdHocJumpEvent

Insert a JumpScript.

Syntax: \jump *markup*

Example: \jump "Gavotte I D.C."

Event classes: ad-hoc-jump-event (page 48), music-event (page 53), and StreamEvent (page 57).

Accepted by: Bar_engraver (page 404), and Jump_engraver (page 428).

Properties:

name (symbol):

'AdHocJumpEvent

Name of this music object.

types (list):

'(ad-hoc-jump-event event)

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

1.1.3 AdHocMarkEvent

Insert markup as a rehearsal mark without advancing the rehearsal mark sequence.

Syntax: \mark *markup*

Example: \mark "A"

Event classes: ad-hoc-mark-event (page 49), mark-event (page 53), music-event (page 53), and StreamEvent (page 57).

Accepted by: `Mark_tracking_translator` (page 433).

Properties:

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

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

1.1.4 AlternativeEvent

Create an alternative event.

Event classes: `alternative-event` (page 49), `music-event` (page 53), and `StreamEvent` (page 57).

Accepted by: `Timing_translator` (page 454).

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.
```

1.1.5 AnnotateOutputEvent

Print an annotation of an output element.

Event classes: `annotate-output-event` (page 49), `music-event` (page 53), and `StreamEvent` (page 57).

Accepted by: `Balloon_engraver` (page 404).

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.
```

1.1.6 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.

1.1.7 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: `apply-output-event` (page 49), `layout-instruction-event` (page 52), `music-event` (page 53), and `StreamEvent` (page 57).

Accepted by: `Output_property_engraver` (page 439).

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.

1.1.8 ArpeggioEvent

Make an arpeggio on this note.

Syntax: `note-\arpeggio`

Event classes: `arpeggio-event` (page 49), `music-event` (page 53), and `StreamEvent` (page 57).

Accepted by: `Arpeggio_engraver` (page 403).

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.

1.1.9 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 `-.`, `->`, `\tenuto`, `\downbow`). See the Notation Reference for details.

Event classes: `articulation-event` (page 49), `music-event` (page 53), `script-event` (page 56), and `StreamEvent` (page 57).

Accepted by: `Beat_engraver` (page 409), `Beat_performer` (page 409), `Drum_note_performer` (page 419), `Note_performer` (page 439), and `Script_engraver` (page 445).

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.
```

1.1.10 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):
  'BarCheck
  Name of this music object.

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

1.1.11 BarEvent

Force a bar line.

Syntax: `\bar type`

Example: `\bar "!"`

Event classes: `bar-event` (page 49), `music-event` (page 53), and `StreamEvent` (page 57).

Accepted by: `Timing_translator` (page 454).

Properties:

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

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

1.1.12 BassFigureEvent

Print a bass-figure text.

Event classes: `bass-figure-event` (page 49), `music-event` (page 53), `rhythmic-event` (page 55), and `StreamEvent` (page 57).

Accepted by: `Figured_bass_engraver` (page 421).

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.

1.1.13 BeamEvent

Start or stop a beam.

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

Event classes: `beam-event` (page 49), `music-event` (page 53), `span-event` (page 57), and `StreamEvent` (page 57).

Accepted by: `Beam_engraver` (page 408), `Beam_performer` (page 408), and `Grace_beam_engraver` (page 425).

Properties:

name (symbol):

'BeamEvent

Name of this music object.

types (list):

'(post-event event beam-event span-event)

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

1.1.14 BeamForbidEvent

Specify that a note may not auto-beamed.

Event classes: `beam-forbid-event` (page 49), `music-event` (page 53), and `StreamEvent` (page 57).

Accepted by: `Auto_beam_engraver` (page 403), and `Grace_auto_beam_engraver` (page 425).

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.

1.1.15 BendAfterEvent

A drop/fall/doit jazz articulation.

Event classes: bend-after-event (page 49), music-event (page 53), and StreamEvent (page 57).

Accepted by: Bend_engraver (page 410).

Properties:

name (symbol):

'BendAfterEvent

Name of this music object.

types (list):

'(post-event bend-after-event event)

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

1.1.16 BendSpanEvent

Used to signal where a bend spanner starts and stops.

Event classes: bend-span-event (page 50), music-event (page 53), span-event (page 57), and StreamEvent (page 57).

Accepted by: Bend_spanner_engraver (page 410).

Properties:

name (symbol):

'BendSpanEvent

Name of this music object.

types (list):

'(bend-span-event post-event span-event event)

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

1.1.17 BreakDynamicSpanEvent

End an alignment spanner for dynamics here.

Event classes: break-dynamic-span-event (page 50), break-span-event (page 50), music-event (page 53), and StreamEvent (page 57).

Accepted by: Dynamic_engraver (page 420).

Properties:

name (symbol):

'BreakDynamicSpanEvent

Name of this music object.

types (list):

'(post-event
break-span-event
break-dynamic-span-event
event)

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

1.1.18 BreathingEvent

A short span of silence that shortens the previous note.

Syntax: *note*\breathe

Event classes: *breathing-event* (page 50), *music-event* (page 53), and *StreamEvent* (page 57).

Accepted by: *Breathing_sign_engraver* (page 411), and *Note_performer* (page 439).

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.

1.1.19 CaesuraEvent

A short span of silence that does not shorten the previous note.

Syntax: *note*\caesura

Event classes: *caesura-event* (page 50), *music-event* (page 53), and *StreamEvent* (page 57).

Accepted by: *Bar_engraver* (page 404), *Caesura_engraver* (page 411), and *Divisio_engraver* (page 417).

Properties:

name (symbol):

'CaesuraEvent

Name of this music object.

types (list):

'(caesura-event event)

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

1.1.20 ClusterNoteEvent

A note that is part of a cluster.

Event classes: *cluster-note-event* (page 50), *melodic-event* (page 53), *music-event* (page 53), *rhythmic-event* (page 55), and *StreamEvent* (page 57).

Accepted by: *Cluster_spanner_engraver* (page 414).

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

```

1.1.21 CodaMarkEvent

Add a coda mark.

Event classes: coda-mark-event (page 50), music-event (page 53), and StreamEvent (page 57).

Accepted by: Bar_engraver (page 404), and Mark_tracking_translator (page 433).

Properties:

```

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

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

```

1.1.22 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: completize-extender-event (page 50), music-event (page 53), and StreamEvent (page 57).

Accepted by: Extender_engraver (page 421).

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.

```

1.1.23 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.

1.1.24 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.

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.

1.1.25 CrescendoEvent

Begin or end a crescendo.

Syntax: *note*\< ... *note*!

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

Event classes: *crescendo-event* (page 50), *music-event* (page 53), *span-dynamic-event* (page 56), *span-event* (page 57), and *StreamEvent* (page 57).

Accepted by: *Dynamic_engraver* (page 420), and *Dynamic_performer* (page 421).

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.

1.1.26 DalSegnoEvent

Add a *D.S.* or similar instruction.

Event classes: `dal-segno-event` (page 51), `music-event` (page 53), and `StreamEvent` (page 57).

Accepted by: `Bar_engraver` (page 404), `Jump_engraver` (page 428), and `Volta_engraver` (page 457).

Properties:

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

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

1.1.27 DecrescendoEvent

Begin or end a decrescendo.

Syntax: *note*\> ... *note*\!

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

Event classes: `decrescendo-event` (page 51), `music-event` (page 53), `span-dynamic-event` (page 56), `span-event` (page 57), and `StreamEvent` (page 57).

Accepted by: `Dynamic_engraver` (page 420), and `Dynamic_performer` (page 421).

Properties:

```
name (symbol):
  'DecrescendoEvent
  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.
```

1.1.28 DoublePercentEvent

Used internally to signal double percent repeats.

Event classes: `double-percent-event` (page 51), `music-event` (page 53), `rhythmic-event` (page 55), and `StreamEvent` (page 57).

Accepted by: `Double_percent_repeat_engraver` (page 418).

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.

1.1.29 DurationLineEvent

Initiate a duration line.

Syntax: *note*\-

Event classes: duration-line-event (page 51), music-event (page 53), and StreamEvent (page 57).

Accepted by: Duration_line_engraver (page 419).

Properties:

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

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

1.1.30 EpisemaEvent

Begin or end an episema.

Event classes: episema-event (page 51), music-event (page 53), span-event (page 57), and StreamEvent (page 57).

Accepted by: Episema_engraver (page 421).

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.

1.1.31 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.

1.1.32 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.

1.1.33 ExtenderEvent

Extend lyrics.

Event classes: extender-event (page 51), music-event (page 53), and StreamEvent (page 57).

Accepted by: Extender_engraver (page 421).

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.

1.1.34 FineEvent

End the performance, not necessarily at the written end of the music.

Event classes: `fine-event` (page 51), `music-event` (page 53), and `StreamEvent` (page 57).

Accepted by: `Bar_engraver` (page 404), `Divisio_engraver` (page 417), `Jump_engraver` (page 428), `Timing_translator` (page 454), and `Volta_engraver` (page 457).

Properties:

`iterator-ctor` (procedure):

`ly:fine-iterator::constructor`

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

`name` (symbol):

`'FineEvent`

Name of this music object.

`types` (list):

`'(fine-event event)`

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

1.1.35 FingerGlideEvent

Initiate a line connecting two equal fingerings. This line represents a finger gliding on a string.

Syntax: `note\glide-finger`

Event classes: `finger-glide-event` (page 51), `music-event` (page 53), `span-event` (page 57), and `StreamEvent` (page 57).

Not accepted by any engraver or performer.

Properties:

`name` (symbol):

`'FingerGlideEvent`

Name of this music object.

`types` (list):

`'(finger-glide-event post-event event)`

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

1.1.36 FingeringEvent

Specify what finger to use for this note.

Event classes: `fingering-event` (page 51), `music-event` (page 53), and `StreamEvent` (page 57).

Accepted by: `Fingering_engraver` (page 423), `Fretboard_engraver` (page 424), and `Tab_note_heads_engraver` (page 451).

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.

1.1.37 FootnoteEvent

Footnote a grob.

Event classes: footnote-event (page 52), music-event (page 53), and StreamEvent (page 57).

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.

1.1.38 GlissandoEvent

Start a glissando on this note.

Event classes: glissando-event (page 52), music-event (page 53), and StreamEvent (page 57).

Accepted by: Glissando_engraver (page 424).

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.

1.1.39 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 endpoint of this music. This property is unhappily named in that it does not account for any initial grace notes: the full length of the music is length minus the start time. A value of INF-MOMENT indicates indefinite length.

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.

1.1.40 HarmonicEvent

Mark a note as harmonic.

Event classes: harmonic-event (page 52), music-event (page 53), and StreamEvent (page 57).

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.

1.1.41 HyphenEvent

A hyphen between lyric syllables.

Event classes: hyphen-event (page 52), music-event (page 53), and StreamEvent (page 57).

Accepted by: Hyphen_engraver (page 427).

Properties:

name (symbol):

'HyphenEvent

Name of this music object.

types (list):

'(post-event hyphen-event event)

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

1.1.42 KeyChangeEvent

Change the key signature.

Syntax: \key *name scale*

Event classes: key-change-event (page 52), music-event (page 53), and StreamEvent (page 57).

Accepted by: Key_engraver (page 429), and Key_performer (page 430).

Properties:

name (symbol):

'KeyChangeEvent

Name of this music object.

to-relative-callback (procedure):

#<procedure 7f3392df4d40 at ice-9/eval.scm:336:13 (a b)>

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.

1.1.43 LabelEvent

Place a bookmarking label.

Event classes: label-event (page 52), music-event (page 53), and StreamEvent (page 57).

Accepted by: Paper_column_engraver (page 440).

Properties:

name (symbol):

'LabelEvent

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.

1.1.44 LaissezVibrerEvent

Don't damp this chord.

Syntax: *note*\laissezVibrer

Event classes: laissez-vibrer-event (page 52), music-event (page 53), and StreamEvent (page 57).

Accepted by: Laissez_vibrer_engraver (page 431).

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.

1.1.45 LigatureEvent

Start or end a ligature.

Event classes: ligature-event (page 52), music-event (page 53), span-event (page 57), and StreamEvent (page 57).

Accepted by: Kievan_ligature_engraver (page 431), Ligature_bracket_engraver (page 431), Mensural_ligature_engraver (page 435), and Vaticana_ligature_engraver (page 456).

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.

1.1.46 LineBreakEvent

Allow, forbid or force a line break.

Event classes: break-event (page 50), line-break-event (page 52), music-event (page 53), and StreamEvent (page 57).

Accepted by: Page_turn_engraver (page 440), and Paper_column_engraver (page 440).

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.

1.1.47 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 infinity>

The endpoint of this music. This property is unhappily named in that it does not account for any initial grace notes: the full length of the music is length minus the start time. A value of INF-MOMENT indicates indefinite length.

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.

1.1.48 LyricEvent

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

Event classes: lyric-event (page 53), music-event (page 53), rhythmic-event (page 55), and StreamEvent (page 57).

Accepted by: Lyric_engraver (page 431), and Lyric_performer (page 432).

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.

```

1.1.49 MeasureCounterEvent

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

Event classes: `measure-counter-event` (page 53), `music-event` (page 53), `span-event` (page 57), and `StreamEvent` (page 57).

Accepted by: `Measure_counter_engraver` (page 434).

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.

```

1.1.50 MeasureSpannerEvent

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

Event classes: `measure-spanner-event` (page 53), `music-event` (page 53), `span-event` (page 57), and `StreamEvent` (page 57).

Accepted by: `Measure_spanner_engraver` (page 435).

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.

```

1.1.51 MultiMeasureArticulationEvent

Articulations on multi-measure rests.

Event classes: `multi-measure-articulation-event` (page 53), `music-event` (page 53), and `StreamEvent` (page 57).

Accepted by: `Multi_measure_rest_engraver` (page 437).

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.
```

1.1.52 MultiMeasureRestEvent

Used internally by MultiMeasureRestMusic to signal rests.

Event classes: `general-rest-event` (page 52), `multi-measure-rest-event` (page 53), `music-event` (page 53), `rhythmic-event` (page 55), and `StreamEvent` (page 57).

Accepted by: `Current_chord_text_engraver` (page 416), and `Multi_measure_rest_engraver` (page 437).

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
    general-rest-event
    multi-measure-rest-event)
  The types of this music object; determines by what engraver this music expression is
  processed.
```

1.1.53 MultiMeasureRestMusic

Rests that may be compressed into multi-measure rests.

Syntax: `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 pa-
  rameter.

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.

1.1.54 MultiMeasureTextEvent

Texts on multi-measure rests.

Syntax: R-\markup { \roman "bla" }

Note the explicit font switch.

Event classes: multi-measure-text-event (page 53), music-event (page 53), and StreamEvent (page 57).

Accepted by: Multi_measure_rest_engraver (page 437).

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.

1.1.55 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.

1.1.56 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 1.1.32 [EventChord], page 12.

Event classes: melodic-event (page 53), music-event (page 53), note-event (page 54), rhythmic-event (page 55), and StreamEvent (page 57).

Accepted by: Beat_engraver (page 409), Beat_performer (page 409), Bend_spanner_engraver (page 410), Completion_heads_engraver (page 414), Current_chord_text_engraver (page 416), Drum_note_performer (page 419), Drum_notes_engraver (page 419), Finger_glide_engraver (page 422), Fretboard_engraver (page 424), Note_heads_engraver (page 438), Note_name_engraver (page 438), Note_performer (page 439), Part_combine_engraver (page 441), Phrasing_slur_engraver (page 442), Slur_engraver (page 447), and Tab_note_heads_engraver (page 451).

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.

```

1.1.57 NoteGroupingEvent

Start or stop grouping brackets.

Event classes: music-event (page 53), note-grouping-event (page 54), and StreamEvent (page 57).

Accepted by: Horizontal_bracket_engraver (page 427).

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.

```

1.1.58 OttavaEvent

Start or stop an ottava bracket.

Event classes: music-event (page 53), ottava-event (page 54), and StreamEvent (page 57).

Accepted by: Ottava_spanner_engraver (page 439).

Properties:

```

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

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

```

1.1.59 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.

types (list):
 '(layout-instruction-event
 override-property-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.

1.1.60 PageBreakEvent

Allow, forbid or force a page break.

Event classes: break-event (page 50), music-event (page 53), page-break-event (page 54), and StreamEvent (page 57).

Accepted by: Page_turn_engraver (page 440), and Paper_column_engraver (page 440).

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.

1.1.61 PageTurnEvent

Allow, forbid or force a page turn.

Event classes: break-event (page 50), music-event (page 53), page-turn-event (page 54), and StreamEvent (page 57).

Accepted by: Page_turn_engraver (page 440), and Paper_column_engraver (page 440).

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.

1.1.62 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.

1.1.63 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.

1.1.64 PercentEvent

Used internally to signal percent repeats.

Event classes: music-event (page 53), percent-event (page 55), and StreamEvent (page 57).

Accepted by: Percent_repeat_engraver (page 441).

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.

1.1.65 PercentRepeatedMusic

Repeats encoded by percents and slashes.

Properties:

elements-callback (procedure):

make-percent-set

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

iterator-ctor (procedure):

ly:percent-repeat-iterator::constructor

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

length-callback (procedure):

ly:calculated-sequential-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:calculated-sequential-music::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 percent-repeated-music)

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

1.1.66 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: music-event (page 53), pes-or-flexa-event (page 55), and StreamEvent (page 57).

Accepted by: Vaticana_ligature_engraver (page 456).

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.

1.1.67 PhrasingSlurEvent

Start or end phrasing slur.

Syntax: *note*(and *note*)

Event classes: *music-event* (page 53), *phrasing-slur-event* (page 55), *span-event* (page 57), and *StreamEvent* (page 57).

Accepted by: *Phrasing_slur_engraver* (page 442).

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.

1.1.68 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.

1.1.69 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.

1.1.70 PropertyUnset

Restore the default setting for a context property. See Section 1.1.69 [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.

1.1.71 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.

1.1.72 RehearsalMarkEvent

Insert a rehearsal mark.

Syntax: `\mark marker`

Example: `\mark 3`

Event classes: `mark-event` (page 53), `music-event` (page 53), `rehearsal-mark-event` (page 55), and `StreamEvent` (page 57).

Accepted by: `Mark_tracking_translator` (page 433).

Properties:

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

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

1.1.73 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.

1.1.74 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.

1.1.75 RepeatSlashEvent

Used internally to signal beat repeats.

Event classes: music-event (page 53), repeat-slash-event (page 55), rhythmic-event (page 55), and StreamEvent (page 57).

Accepted by: Slash_repeat_engraver (page 447).

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.

1.1.76 RepeatTieEvent

Ties for starting a second volta bracket.

Event classes: music-event (page 53), repeat-tie-event (page 55), and StreamEvent (page 57).

Accepted by: Repeat_tie_engraver (page 444).

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.

1.1.77 RestEvent

A Rest.

Syntax: r4 for a quarter rest.

Event classes: general-rest-event (page 52), music-event (page 53), rest-event (page 55), rhythmic-event (page 55), and StreamEvent (page 57).

Accepted by: Completion_rest_engraver (page 415), Current_chord_text_engraver (page 416), Figured_bass_engraver (page 421), and Rest_engraver (page 444).

Properties:

iterator-ctor (procedure):

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
          general-rest-event
          rest-event)

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

```

1.1.78 RevertProperty

The opposite of Section 1.1.59 [OverrideProperty], page 21: remove a previously added property from a graphical object definition.

Properties:

```

iterator-ctor (procedure):
  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.

```

1.1.79 ScriptEvent

Add an articulation mark to a note.

Event classes: music-event (page 53), script-event (page 56), and StreamEvent (page 57).

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.

```

1.1.80 SectionEvent

Add a section division, which is typically written as a thin double bar line.

Event classes: music-event (page 53), section-event (page 56), and StreamEvent (page 57).

Accepted by: Bar_engraver (page 404), and Divisio_engraver (page 417).

Properties:

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

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

1.1.81 SectionLabelEvent

Mark the beginning of a named passage. Does not imply a section division.

Event classes: music-event (page 53), section-label-event (page 56), and StreamEvent (page 57).

Accepted by: Mark_tracking_translator (page 433).

Properties:

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

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

1.1.82 SegnoMarkEvent

Add a segno mark or bar line.

Event classes: music-event (page 53), segno-mark-event (page 56), and StreamEvent (page 57).

Accepted by: Bar_engraver (page 404), and Mark_tracking_translator (page 433).

Properties:

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

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

1.1.83 SegnoRepeatedMusic

Repeats with alternatives placed sequentially and marked with segno, Coda, *D.C.*, etc.

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:calculated-sequential-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):
`'SegnoRepeatedMusic`
 Name of this music object.

`start-callback` (procedure):
`ly:calculated-sequential-music::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):
`'(segno-repeated-music`
`folded-repeated-music`
`repeated-music)`
 The types of this music object; determines by what engraver this music expression is processed.

1.1.84 SequentialAlternativeMusic

Repeat alternatives in sequence.

Syntax: `\alternative { alternatives }`

Properties:

`elements-callback` (procedure):
`#<procedure 7f3392e06080 at ice-9/eval.scm:333:13 (a)>`
 Return a list of children, for use by a sequential iterator. Takes a single music parameter.

`iterator-ctor` (procedure):
`ly:alternative-sequence-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):
`'SequentialAlternativeMusic`
 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 sequential-alternative-music)

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

1.1.85 SequentialMusic

Music expressions concatenated.

Syntax: \sequential { ... } or simply { ... }

Properties:

elements-callback (procedure):

#<procedure 7f3392e07480 at ice-9/eval.scm:333:13 (a)>

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.

1.1.86 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.

1.1.87 SkipEvent

Filler that takes up duration, but does not print anything.

Syntax: `s4` for a skip equivalent to a quarter rest.

Event classes: `music-event` (page 53), `rhythmic-event` (page 55), `skip-event` (page 56), and `StreamEvent` (page 57).

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.

1.1.88 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.

`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.

1.1.89 SkippedMusic

Filler that takes up duration, does not print anything, and also does not create staves or voices implicitly.

Syntax: `\skip music`

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-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):

`'SkippedMusic`

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):

`'(skipped-music music-wrapper-music)`

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

1.1.90 SlurEvent

Start or end slur.

Syntax: `note(` and `note)`

Event classes: `music-event` (page 53), `slur-event` (page 56), `span-event` (page 57), and `StreamEvent` (page 57).

Accepted by: `Slur_engraver` (page 447), and `Slur_performer` (page 447).

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.

1.1.91 SoloOneEvent

Print 'Solo 1'.

Event classes: `music-event` (page 53), `part-combine-event` (page 55), `solo-one-event` (page 56), and `StreamEvent` (page 57).

Accepted by: `Part_combine_engraver` (page 441).

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.
```

1.1.92 SoloTwoEvent

Print 'Solo 2'.

Event classes: music-event (page 53), part-combine-event (page 55), solo-two-event (page 56), and StreamEvent (page 57).

Accepted by: Part_combine_engraver (page 441).

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.
```

1.1.93 SostenutoEvent

Depress or release sostenuto pedal.

Event classes: music-event (page 53), pedal-event (page 55), sostenuto-event (page 56), span-event (page 57), and StreamEvent (page 57).

Accepted by: Piano_pedal_engraver (page 442), and Piano_pedal_performer (page 443).

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.
```

1.1.94 SpacingSectionEvent

Start a new spacing section.

Event classes: `music-event` (page 53), `spacing-section-event` (page 56), and `StreamEvent` (page 57).

Accepted by: `Spacing_engraver` (page 447).

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.

1.1.95 SpanEvent

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

Event classes: `music-event` (page 53), `span-event` (page 57), and `StreamEvent` (page 57).

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.

1.1.96 StaffHighlightEvent

Start or stop a staff highlight.

Syntax: `\staffHighlight`, `\stopStaffHighlight`.

Event classes: `music-event` (page 53), `span-event` (page 57), `staff-highlight-event` (page 57), and `StreamEvent` (page 57).

Accepted by: `Staff_highlight_engraver` (page 449).

Properties:

name (symbol):

`'StaffHighlightEvent`

Name of this music object.

types (list):

`'(staff-highlight-event span-event event)`

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

1.1.97 StaffSpanEvent

Start or stop a staff symbol.

Event classes: `music-event` (page 53), `span-event` (page 57), `staff-span-event` (page 57), and `StreamEvent` (page 57).

Accepted by: `Staff_symbol_engraver` (page 449).

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.

1.1.98 StringNumberEvent

Specify on which string to play this note.

Syntax: `\number`

Event classes: `music-event` (page 53), `StreamEvent` (page 57), and `string-number-event` (page 58).

Accepted by: `Bend_spanner_engraver` (page 410), `Fretboard_engraver` (page 424), and `Tab_note_heads_engraver` (page 451).

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.

1.1.99 StrokeFingerEvent

Specify with which finger to pluck a string.

Syntax: `\rightHandFinger text`

Event classes: `music-event` (page 53), `StreamEvent` (page 57), and `stroke-finger-event` (page 58).

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.

1.1.100 SustainEvent

Depress or release sustain pedal.

Event classes: `music-event` (page 53), `pedal-event` (page 55), `span-event` (page 57), `StreamEvent` (page 57), and `sustain-event` (page 58).

Accepted by: `Piano_pedal_engraver` (page 442), and `Piano_pedal_performer` (page 443).

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.

1.1.101 TempoChangeEvent

A metronome mark or tempo indication.

Event classes: `music-event` (page 53), `StreamEvent` (page 57), and `tempo-change-event` (page 58).

Accepted by: `Metronome_mark_engraver` (page 436).

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.

1.1.102 TextMarkEvent

A textual mark.

Syntax: `\textMark markup` or `\textEndMark markup`.

Event classes: `music-event` (page 53), `StreamEvent` (page 57), and `text-mark-event` (page 58).

Accepted by: `Text_mark_engraver` (page 452).

Properties:

name (symbol):

'TextMarkEvent

Name of this music object.

types (list):

'(text-mark-event event)

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

1.1.103 TextScriptEvent

Print text.

Event classes: `music-event` (page 53), `script-event` (page 56), `StreamEvent` (page 57), and `text-script-event` (page 58).

Accepted by: `Text_engraver` (page 452).

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.

1.1.104 TextSpanEvent

Start a text spanner, for example, an octavation.

Event classes: `music-event` (page 53), `span-event` (page 57), `StreamEvent` (page 57), and `text-span-event` (page 58).

Accepted by: `Text_spanner_engraver` (page 453).

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.

1.1.105 TieEvent

A tie.

Syntax: *note--*

Event classes: `music-event` (page 53), `StreamEvent` (page 57), and `tie-event` (page 58).

Accepted by: `Drum_note_performer` (page 419), `Note_performer` (page 439), `Tie_engraver` (page 453), and `Tie_performer` (page 453).

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.

1.1.106 TimeScaledMusic

Multiply durations, as in tuplets.

Syntax: `\times fraction music`, e.g., `\times 2/3 { ... }` for triplets.

Properties:

```

iterator-ctor (procedure):
  ly:tuplet-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):
  'TimeScaledMusic
  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):
  '(time-scaled-music)
  The types of this music object; determines by what engraver this music expression is
  processed.
```

1.1.107 TimeSignatureEvent

An event created when setting a new time signature

Event classes: `music-event` (page 53), `StreamEvent` (page 57), and `time-signature-event` (page 58).

Accepted by: `Time_signature_engraver` (page 454), and `Time_signature_performer` (page 454).

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.
```

1.1.108 TimeSignatureMusic

Set a new time signature

Properties:

```

elements-callback (procedure):
  make-time-signature-set
  Return a list of children, for use by a sequential iterator. Takes a single music pa-
  rameter.
```



```

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.

```

1.1.109 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.

```

1.1.110 TremoloEvent

Unmeasured tremolo.

Event classes: `music-event` (page 53), `StreamEvent` (page 57), and `tremolo-event` (page 58).

Accepted by: `Stem_engraver` (page 450).

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.

1.1.111 TremoloRepeatedMusic

Repeated notes denoted by tremolo beams.

Properties:

elements-callback (procedure):

make-tremolo-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:calculated-sequential-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:calculated-sequential-music::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.

1.1.112 TremoloSpanEvent

Tremolo over two stems.

Event classes: music-event (page 53), span-event (page 57), StreamEvent (page 57), and tremolo-span-event (page 59).

Accepted by: Chord_tremolo_engraver (page 413).

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.

1.1.113 TrillSpanEvent

Start a trill spanner.

Event classes: `music-event` (page 53), `span-event` (page 57), `StreamEvent` (page 57), and `trill-span-event` (page 59).

Accepted by: `Trill_spanner_engraver` (page 455).

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.

1.1.114 TupletSpanEvent

Used internally to signal where tuplet brackets start and stop.

Event classes: `music-event` (page 53), `span-event` (page 57), `StreamEvent` (page 57), and `tuplet-span-event` (page 59).

Accepted by: `Stem_engraver` (page 450), and `Tuplet_engraver` (page 456).

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.

1.1.115 UnaCordaEvent

Depress or release una-corda pedal.

Event classes: `music-event` (page 53), `pedal-event` (page 55), `span-event` (page 57), `StreamEvent` (page 57), and `una-corda-event` (page 59).

Accepted by: `Piano_pedal_engraver` (page 442), and `Piano_pedal_performer` (page 443).

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.

1.1.116 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:calculated-sequential-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:calculated-sequential-music::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.

1.1.117 UnfoldedSpeccedMusic

Music that appears once repeated music is unfolded.

Properties:

`iterator-ctor` (procedure):

`ly:music-iterator::constructor`

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

`length` (moment):

`#<Mom 0>`

The endpoint of this music. This property is unhappily named in that it does not account for any initial grace notes: the full length of the music is length minus the start time. A value of `INF-MOMENT` indicates indefinite length.

`name` (symbol):

`'UnfoldedSpeccedMusic`

Name of this music object.

`types` (list):

`'(unfolded-specification music-wrapper-music)`

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

1.1.118 UnisonoEvent

Print 'a 2'.

Event classes: `music-event` (page 53), `part-combine-event` (page 55), `StreamEvent` (page 57), and `unisono-event` (page 59).

Accepted by: `Part_combine_engraver` (page 441).

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.

1.1.119 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.

1.1.120 VoiceSeparator

Separate polyphonic voices in simultaneous music.

Syntax: \\
 \

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.

1.1.121 VoltaRepeatEndEvent

Signal the end of a volta-style repeat. Multiple end events per start event can be expected when there are alternative endings.

Event classes: music-event (page 53), StreamEvent (page 57), and volta-repeat-end-event (page 59).

Accepted by: Divisio_engraver (page 417), Lyric_repeat_count_engraver (page 432), Repeat_acknowledge_engraver (page 444), and Signum_repetitionis_engraver (page 446).

Properties:

name (symbol):

'VoltaRepeatEndEvent

Name of this music object.

types (list):

'(volta-repeat-end-event event)

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

1.1.122 VoltaRepeatStartEvent

Signal the start of a volta-style repeat.

Event classes: music-event (page 53), StreamEvent (page 57), and volta-repeat-start-event (page 59).

Accepted by: Divisio_engraver (page 417), and Repeat_acknowledge_engraver (page 444).

Properties:

name (symbol):

'VoltaRepeatStartEvent

Name of this music object.

types (list):

'(volta-repeat-start-event event)

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

1.1.123 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:calculated-sequential-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:calculated-sequential-music::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):

`'(volta-repeated-music
folded-repeated-music
repeated-music)`

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

1.1.124 VoltaSpanEvent

Used internally to signal where volta brackets start and stop.

Event classes: `music-event` (page 53), `span-event` (page 57), `StreamEvent` (page 57), and `volta-span-event` (page 59).

Accepted by: `Bar_engraver` (page 404), and `Volta_engraver` (page 457).

Properties:

`name` (symbol):

`'VoltaSpanEvent`

Name of this music object.

`types` (list):

`'(volta-span-event span-event event post-event)`

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

1.1.125 VoltaSpeccedMusic

Music for a specific volta within repeated music.

Properties:

`iterator-ctor` (procedure):
`ly:volta-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`.

`name` (symbol):
`'VoltaSpeccedMusic`
 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):
`'(volta-specification music-wrapper-music)`
 The types of this music object; determines by what engraver this music expression is processed.

1.1.126 VowelTransitionEvent

A vowel transition between lyric syllables.

Event classes: `music-event` (page 53), `StreamEvent` (page 57), and `vowel-transition-event` (page 59).

Accepted by: `Hyphen_engraver` (page 427).

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 `AbsoluteDynamicEvent` (page 1).

Accepted by: `Dynamic_engraver` (page 420), and `Dynamic_performer` (page 421).

1.2.2 ad-hoc-jump-event

Music event type `ad-hoc-jump-event` is in music objects of type `AdHocJumpEvent` (page 1).

Accepted by: `Bar_engraver` (page 404), and `Jump_engraver` (page 428).

1.2.3 ad-hoc-mark-event

Music event type ad-hoc-mark-event is in music objects of type AdHocMarkEvent (page 1).

Accepted by: Mark_tracking_translator (page 433).

1.2.4 alternative-event

Music event type alternative-event is in music objects of type AlternativeEvent (page 2).

Accepted by: Timing_translator (page 454).

1.2.5 annotate-output-event

Music event type annotate-output-event is in music objects of type AnnotateOutputEvent (page 2).

Accepted by: Balloon_engraver (page 404).

1.2.6 apply-output-event

Music event type apply-output-event is in music objects of type ApplyOutputEvent (page 3).

Accepted by: Output_property_engraver (page 439).

1.2.7 arpeggio-event

Music event type arpeggio-event is in music objects of type ArpeggioEvent (page 3).

Accepted by: Arpeggio_engraver (page 403).

1.2.8 articulation-event

Music event type articulation-event is in music objects of type ArticulationEvent (page 3).

Accepted by: Beat_engraver (page 409), Beat_performer (page 409), Drum_note_performer (page 419), Note_performer (page 439), and Script_engraver (page 445).

1.2.9 bar-event

Music event type bar-event is in music objects of type BarEvent (page 4).

Accepted by: Timing_translator (page 454).

1.2.10 bass-figure-event

Music event type bass-figure-event is in music objects of type BassFigureEvent (page 5).

Accepted by: Figured_bass_engraver (page 421).

1.2.11 beam-event

Music event type beam-event is in music objects of type BeamEvent (page 5).

Accepted by: Beam_engraver (page 408), Beam_performer (page 408), and Grace_beam_engraver (page 425).

1.2.12 beam-forbid-event

Music event type beam-forbid-event is in music objects of type BeamForbidEvent (page 5).

Accepted by: Auto_beam_engraver (page 403), and Grace_auto_beam_engraver (page 425).

1.2.13 bend-after-event

Music event type bend-after-event is in music objects of type BendAfterEvent (page 6).

Accepted by: Bend_engraver (page 410).

1.2.14 bend-span-event

Music event type bend-span-event is in music objects of type BendSpanEvent (page 6).

Accepted by: Bend_spanner_engraver (page 410).

1.2.15 break-dynamic-span-event

Music event type break-dynamic-span-event is in music objects of type BreakDynamicSpanEvent (page 6).

Accepted by: Dynamic_engraver (page 420).

1.2.16 break-event

Music event type break-event is in music objects of type LineBreakEvent (page 17), PageBreakEvent (page 22), and PageTurnEvent (page 22).

Accepted by: Page_turn_engraver (page 440), and Paper_column_engraver (page 440).

1.2.17 break-span-event

Music event type break-span-event is in music objects of type BreakDynamicSpanEvent (page 6).

Not accepted by any engraver or performer.

1.2.18 breathing-event

Music event type breathing-event is in music objects of type BreathingEvent (page 7).

Accepted by: Breathing_sign_engraver (page 411), and Note_performer (page 439).

1.2.19 caesura-event

Music event type caesura-event is in music objects of type CaesuraEvent (page 7).

Accepted by: Bar_engraver (page 404), Caesura_engraver (page 411), and Divisio_engraver (page 417).

1.2.20 cluster-note-event

Music event type cluster-note-event is in music objects of type ClusterNoteEvent (page 7).

Accepted by: Cluster_spanner_engraver (page 414).

1.2.21 coda-mark-event

Music event type coda-mark-event is in music objects of type CodaMarkEvent (page 8).

Accepted by: Bar_engraver (page 404), and Mark_tracking_translator (page 433).

1.2.22 completize-extender-event

Music event type completize-extender-event is in music objects of type CompletizeExtenderEvent (page 8).

Accepted by: Extender_engraver (page 421).

1.2.23 crescendo-event

Music event type crescendo-event is in music objects of type CrescendoEvent (page 9).

Accepted by: Dynamic_performer (page 421).

1.2.24 dal-segno-event

Music event type dal-segno-event is in music objects of type DalSegnoEvent (page 10).

Accepted by: Bar_engraver (page 404), Jump_engraver (page 428), and Volta_engraver (page 457).

1.2.25 decrescendo-event

Music event type decrescendo-event is in music objects of type DecrescendoEvent (page 10).

Accepted by: Dynamic_performer (page 421).

1.2.26 double-percent-event

Music event type double-percent-event is in music objects of type DoublePercentEvent (page 10).

Accepted by: Double_percent_repeat_engraver (page 418).

1.2.27 duration-line-event

Music event type duration-line-event is in music objects of type DurationLineEvent (page 11).

Accepted by: Duration_line_engraver (page 419).

1.2.28 dynamic-event

Music event type dynamic-event is in music objects of type AbsoluteDynamicEvent (page 1).

Not accepted by any engraver or performer.

1.2.29 episema-event

Music event type episema-event is in music objects of type EpisemaEvent (page 11).

Accepted by: Episema_engraver (page 421).

1.2.30 extender-event

Music event type extender-event is in music objects of type ExtenderEvent (page 12).

Accepted by: Extender_engraver (page 421).

1.2.31 fine-event

Music event type fine-event is in music objects of type FineEvent (page 13).

Accepted by: Bar_engraver (page 404), Divisio_engraver (page 417), Jump_engraver (page 428), Timing_translator (page 454), and Volta_engraver (page 457).

1.2.32 finger-glide-event

Music event type finger-glide-event is in music objects of type FingerGlideEvent (page 13).

Not accepted by any engraver or performer.

1.2.33 fingering-event

Music event type fingering-event is in music objects of type FingeringEvent (page 13).

Accepted by: Fingering_engraver (page 423), Fretboard_engraver (page 424), and Tab_note_heads_engraver (page 451).

1.2.34 footnote-event

Music event type footnote-event is in music objects of type FootnoteEvent (page 14).

Not accepted by any engraver or performer.

1.2.35 general-rest-event

Music event type general-rest-event is in music objects of type MultiMeasureRestEvent (page 19), and RestEvent (page 28).

Accepted by: Current_chord_text_engraver (page 416).

1.2.36 glissando-event

Music event type glissando-event is in music objects of type GlissandoEvent (page 14).

Accepted by: Glissando_engraver (page 424).

1.2.37 harmonic-event

Music event type harmonic-event is in music objects of type HarmonicEvent (page 15).

Not accepted by any engraver or performer.

1.2.38 hyphen-event

Music event type hyphen-event is in music objects of type HyphenEvent (page 15).

Accepted by: Hyphen_engraver (page 427).

1.2.39 key-change-event

Music event type key-change-event is in music objects of type KeyChangeEvent (page 15).

Accepted by: Key_engraver (page 429), and Key_performer (page 430).

1.2.40 label-event

Music event type label-event is in music objects of type LabelEvent (page 16).

Accepted by: Paper_column_engraver (page 440).

1.2.41 laissez-vibrer-event

Music event type laissez-vibrer-event is in music objects of type LaissezVibrerEvent (page 16).

Accepted by: Laissez_vibrer_engraver (page 431).

1.2.42 layout-instruction-event

Music event type layout-instruction-event is in music objects of type ApplyOutputEvent (page 3).

Not accepted by any engraver or performer.

1.2.43 ligature-event

Music event type ligature-event is in music objects of type LigatureEvent (page 16).

Accepted by: Kievan_ligature_engraver (page 431), Ligature_bracket_engraver (page 431), Mensural_ligature_engraver (page 435), and Vaticana_ligature_engraver (page 456).

1.2.44 line-break-event

Music event type line-break-event is in music objects of type LineBreakEvent (page 17).

Not accepted by any engraver or performer.

1.2.45 lyric-event

Music event type lyric-event is in music objects of type LyricEvent (page 17).

Accepted by: Lyric_engraver (page 431), and Lyric_performer (page 432).

1.2.46 mark-event

Music event type mark-event is in music objects of type AdHocMarkEvent (page 1), and RehearsalMarkEvent (page 26).

Not accepted by any engraver or performer.

1.2.47 measure-counter-event

Music event type measure-counter-event is in music objects of type MeasureCounterEvent (page 18).

Accepted by: Measure_counter_engraver (page 434).

1.2.48 measure-spanner-event

Music event type measure-spanner-event is in music objects of type MeasureSpannerEvent (page 18).

Accepted by: Measure_spanner_engraver (page 435).

1.2.49 melodic-event

Music event type melodic-event is in music objects of type ClusterNoteEvent (page 7), and NoteEvent (page 20).

Not accepted by any engraver or performer.

1.2.50 multi-measure-articulation-event

Music event type multi-measure-articulation-event is in music objects of type MultiMeasureArticulationEvent (page 18).

Accepted by: Multi_measure_rest_engraver (page 437).

1.2.51 multi-measure-rest-event

Music event type multi-measure-rest-event is in music objects of type MultiMeasureRestEvent (page 19).

Accepted by: Multi_measure_rest_engraver (page 437).

1.2.52 multi-measure-text-event

Music event type multi-measure-text-event is in music objects of type MultiMeasureTextEvent (page 20).

Accepted by: Multi_measure_rest_engraver (page 437).

1.2.53 music-event

Music event type music-event is in music objects of type AbsoluteDynamicEvent (page 1), AdHocJumpEvent (page 1), AdHocMarkEvent (page 1), AlternativeEvent (page 2), AnnotateOutputEvent (page 2), ApplyOutputEvent (page 3), ArpeggioEvent (page 3), ArticulationEvent (page 3), BarEvent (page 4), BassFigureEvent (page 5), BeamEvent (page 5), BeamForbidEvent (page 5), BendAfterEvent (page 6), BendSpanEvent (page 6), BreakDynamicSpanEvent (page 6), BreathingEvent (page 7), CaesuraEvent (page 7), ClusterNoteEvent (page 7), CodaMarkEvent (page 8), CompletizeExtenderEvent (page 8), CrescendoEvent (page 9), DalSegnoEvent (page 10), DecrescendoEvent (page 10), DoublePercentEvent (page 10), DurationLineEvent (page 11), EpisemaEvent

(page 11), ExtenderEvent (page 12), FineEvent (page 13), FingerGlideEvent (page 13), FingeringEvent (page 13), FootnoteEvent (page 14), GlissandoEvent (page 14), HarmonicEvent (page 15), HyphenEvent (page 15), KeyChangeEvent (page 15), LabelEvent (page 16), LaissezVibrerEvent (page 16), LigatureEvent (page 16), LineBreakEvent (page 17), LyricEvent (page 17), MeasureCounterEvent (page 18), MeasureSpannerEvent (page 18), MultiMeasureArticulationEvent (page 18), MultiMeasureRestEvent (page 19), MultiMeasureTextEvent (page 20), NoteEvent (page 20), NoteGroupingEvent (page 21), OttavaEvent (page 21), PageBreakEvent (page 22), PageTurnEvent (page 22), PercentEvent (page 23), PesOrFlexaEvent (page 24), PhrasingSlurEvent (page 25), RehearsalMarkEvent (page 26), RepeatSlashEvent (page 28), RepeatTieEvent (page 28), RestEvent (page 28), ScriptEvent (page 29), SectionEvent (page 29), SectionLabelEvent (page 30), SegnoMarkEvent (page 30), SkipEvent (page 33), SlurEvent (page 34), SoloOneEvent (page 34), SoloTwoEvent (page 35), SostenuotoEvent (page 35), SpacingSectionEvent (page 36), SpanEvent (page 36), StaffHighlightEvent (page 36), StaffSpanEvent (page 37), StringNumberEvent (page 37), StrokeFingerEvent (page 37), SustainEvent (page 38), TempoChangeEvent (page 38), TextMarkEvent (page 38), TextScriptEvent (page 39), TextSpanEvent (page 39), TieEvent (page 39), TimeSignatureEvent (page 40), TremoloEvent (page 41), TremoloSpanEvent (page 42), TrillSpanEvent (page 43), TupletSpanEvent (page 43), UnaCordaEvent (page 43), UnisonoEvent (page 45), VoltaRepeatEndEvent (page 46), VoltaRepeatStartEvent (page 46), VoltaSpanEvent (page 47), and VowelTransitionEvent (page 48).

Not accepted by any engraver or performer.

1.2.54 note-event

Music event type note-event is in music objects of type NoteEvent (page 20).

Accepted by: Beat_engraver (page 409), Beat_performer (page 409), Bend_spanner_engraver (page 410), Completion_heads_engraver (page 414), Current_chord_text_engraver (page 416), Drum_note_performer (page 419), Drum_notes_engraver (page 419), Finger_glide_engraver (page 422), Fretboard_engraver (page 424), Note_heads_engraver (page 438), Note_name_engraver (page 438), Note_performer (page 439), Part_combine_engraver (page 441), Phrasing_slur_engraver (page 442), Slur_engraver (page 447), and Tab_note_heads_engraver (page 451).

1.2.55 note-grouping-event

Music event type note-grouping-event is in music objects of type NoteGroupingEvent (page 21).

Accepted by: Horizontal_bracket_engraver (page 427).

1.2.56 ottava-event

Music event type ottava-event is in music objects of type OttavaEvent (page 21).

Accepted by: Ottava_spanner_engraver (page 439).

1.2.57 page-break-event

Music event type page-break-event is in music objects of type PageBreakEvent (page 22).

Not accepted by any engraver or performer.

1.2.58 page-turn-event

Music event type page-turn-event is in music objects of type PageTurnEvent (page 22).

Not accepted by any engraver or performer.

1.2.59 part-combine-event

Music event type part-combine-event is in music objects of type SoloOneEvent (page 34), SoloTwoEvent (page 35), and UnisonoEvent (page 45).

Accepted by: Part_combine_engraver (page 441).

1.2.60 pedal-event

Music event type pedal-event is in music objects of type SostenutoEvent (page 35), SustainEvent (page 38), and UnaCordaEvent (page 43).

Not accepted by any engraver or performer.

1.2.61 percent-event

Music event type percent-event is in music objects of type PercentEvent (page 23).

Accepted by: Percent_repeat_engraver (page 441).

1.2.62 pes-or-flexa-event

Music event type pes-or-flexa-event is in music objects of type PesOrFlexaEvent (page 24).

Accepted by: Vaticana_ligature_engraver (page 456).

1.2.63 phrasing-slur-event

Music event type phrasing-slur-event is in music objects of type PhrasingSlurEvent (page 25).

Accepted by: Phrasing_slur_engraver (page 442).

1.2.64 rehearsal-mark-event

Music event type rehearsal-mark-event is in music objects of type RehearsalMarkEvent (page 26).

Accepted by: Mark_tracking_translator (page 433).

1.2.65 repeat-slash-event

Music event type repeat-slash-event is in music objects of type RepeatSlashEvent (page 28).

Accepted by: Slash_repeat_engraver (page 447).

1.2.66 repeat-tie-event

Music event type repeat-tie-event is in music objects of type RepeatTieEvent (page 28).

Accepted by: Repeat_tie_engraver (page 444).

1.2.67 rest-event

Music event type rest-event is in music objects of type RestEvent (page 28).

Accepted by: Completion_rest_engraver (page 415), Figured_bass_engraver (page 421), and Rest_engraver (page 444).

1.2.68 rhythmic-event

Music event type rhythmic-event is in music objects of type BassFigureEvent (page 5), ClusterNoteEvent (page 7), DoublePercentEvent (page 10), LyricEvent (page 17), MultiMeasureRestEvent (page 19), NoteEvent (page 20), RepeatSlashEvent (page 28), RestEvent (page 28), and SkipEvent (page 33).

Not accepted by any engraver or performer.

1.2.69 script-event

Music event type script-event is in music objects of type ArticulationEvent (page 3), ScriptEvent (page 29), and TextScriptEvent (page 39).

Not accepted by any engraver or performer.

1.2.70 section-event

Music event type section-event is in music objects of type SectionEvent (page 29).

Accepted by: Bar_engraver (page 404), and Divisio_engraver (page 417).

1.2.71 section-label-event

Music event type section-label-event is in music objects of type SectionLabelEvent (page 30).

Accepted by: Mark_tracking_translator (page 433).

1.2.72 segno-mark-event

Music event type segno-mark-event is in music objects of type SegnoMarkEvent (page 30).

Accepted by: Bar_engraver (page 404), and Mark_tracking_translator (page 433).

1.2.73 skip-event

Music event type skip-event is in music objects of type SkipEvent (page 33).

Not accepted by any engraver or performer.

1.2.74 slur-event

Music event type slur-event is in music objects of type SlurEvent (page 34).

Accepted by: Slur_engraver (page 447), and Slur_performer (page 447).

1.2.75 solo-one-event

Music event type solo-one-event is in music objects of type SoloOneEvent (page 34).

Not accepted by any engraver or performer.

1.2.76 solo-two-event

Music event type solo-two-event is in music objects of type SoloTwoEvent (page 35).

Not accepted by any engraver or performer.

1.2.77 sostenuto-event

Music event type sostenuto-event is in music objects of type SostenutoEvent (page 35).

Accepted by: Piano_pedal_engraver (page 442), and Piano_pedal_performer (page 443).

1.2.78 spacing-section-event

Music event type spacing-section-event is in music objects of type SpacingSectionEvent (page 36).

Accepted by: Spacing_engraver (page 447).

1.2.79 span-dynamic-event

Music event type span-dynamic-event is in music objects of type CrescendoEvent (page 9), and DecrescendoEvent (page 10).

Accepted by: Dynamic_engraver (page 420).

1.2.80 span-event

Music event type span-event is in music objects of type BeamEvent (page 5), BendSpanEvent (page 6), CrescendoEvent (page 9), DecrescendoEvent (page 10), EpisemaEvent (page 11), FingerGlideEvent (page 13), LigatureEvent (page 16), MeasureCounterEvent (page 18), MeasureSpannerEvent (page 18), PhrasingSlurEvent (page 25), SlurEvent (page 34), SostenuitoEvent (page 35), SpanEvent (page 36), StaffHighlightEvent (page 36), StaffSpanEvent (page 37), SustainEvent (page 38), TextSpanEvent (page 39), TremoloSpanEvent (page 42), TrillSpanEvent (page 43), TupletSpanEvent (page 43), UnaCordaEvent (page 43), and VoltaSpanEvent (page 47).

Not accepted by any engraver or performer.

1.2.81 staff-highlight-event

Music event type staff-highlight-event is in music objects of type StaffHighlightEvent (page 36).

Accepted by: Staff_highlight_engraver (page 449).

1.2.82 staff-span-event

Music event type staff-span-event is in music objects of type StaffSpanEvent (page 37).

Accepted by: Staff_symbol_engraver (page 449).

1.2.83 StreamEvent

Music event type StreamEvent is in music objects of type AbsoluteDynamicEvent (page 1), AdHocJumpEvent (page 1), AdHocMarkEvent (page 1), AlternativeEvent (page 2), AnnotateOutputEvent (page 2), ApplyOutputEvent (page 3), ArpeggioEvent (page 3), ArticulationEvent (page 3), BarEvent (page 4), BassFigureEvent (page 5), BeamEvent (page 5), BeamForbidEvent (page 5), BendAfterEvent (page 6), BendSpanEvent (page 6), BreakDynamicSpanEvent (page 6), BreathingEvent (page 7), CaesuraEvent (page 7), ClusterNoteEvent (page 7), CodaMarkEvent (page 8), CompletizeExtenderEvent (page 8), CrescendoEvent (page 9), DalSegnoEvent (page 10), DecrescendoEvent (page 10), DoublePercentEvent (page 10), DurationLineEvent (page 11), EpisemaEvent (page 11), ExtenderEvent (page 12), FineEvent (page 13), FingerGlideEvent (page 13), FingeringEvent (page 13), FootnoteEvent (page 14), GlissandoEvent (page 14), HarmonicEvent (page 15), HyphenEvent (page 15), KeyChangeEvent (page 15), LabelEvent (page 16), LaissezVibrerEvent (page 16), LigatureEvent (page 16), LineBreakEvent (page 17), LyricEvent (page 17), MeasureCounterEvent (page 18), MeasureSpannerEvent (page 18), MultiMeasureArticulationEvent (page 18), MultiMeasureRestEvent (page 19), MultiMeasureTextEvent (page 20), NoteEvent (page 20), NoteGroupingEvent (page 21), OttavaEvent (page 21), PageBreakEvent (page 22), PageTurnEvent (page 22), PercentEvent (page 23), PesOrFlexaEvent (page 24), PhrasingSlurEvent (page 25), RehearsalMarkEvent (page 26), RepeatSlashEvent (page 28), RepeatTieEvent (page 28), RestEvent (page 28), ScriptEvent (page 29), SectionEvent (page 29), SectionLabelEvent (page 30), SegnoMarkEvent (page 30), SkipEvent (page 33), SlurEvent (page 34), SoloOneEvent (page 34), SoloTwoEvent (page 35), SostenuitoEvent (page 35), SpacingSectionEvent (page 36), SpanEvent (page 36), StaffHighlightEvent (page 36), StaffSpanEvent (page 37), StringNumberEvent (page 37), StrokeFingerEvent (page 37), SustainEvent (page 38), TempoChangeEvent (page 38), TextMarkEvent (page 38), TextScriptEvent (page 39), TextSpanEvent (page 39), TieEvent (page 39), TimeSignatureEvent (page 40), TremoloEvent (page 41), TremoloSpanEvent (page 42), TrillSpanEvent (page 43), TupletSpanEvent (page 43), UnaCordaEvent (page 43), UnisonoEvent (page 45), VoltaRepeatEndEvent (page 46), VoltaRepeatStartEvent (page 46), VoltaSpanEvent (page 47), and VowelTransitionEvent (page 48).

Not accepted by any engraver or performer.

1.2.84 string-number-event

Music event type string-number-event is in music objects of type StringNumberEvent (page 37).

Accepted by: Bend_spanner_engraver (page 410), Fretboard_engraver (page 424), and Tab_note_heads_engraver (page 451).

1.2.85 stroke-finger-event

Music event type stroke-finger-event is in music objects of type StrokeFingerEvent (page 37).

Not accepted by any engraver or performer.

1.2.86 sustain-event

Music event type sustain-event is in music objects of type SustainEvent (page 38).

Accepted by: Piano_pedal_engraver (page 442), and Piano_pedal_performer (page 443).

1.2.87 tempo-change-event

Music event type tempo-change-event is in music objects of type TempoChangeEvent (page 38).

Accepted by: Metronome_mark_engraver (page 436).

1.2.88 text-mark-event

Music event type text-mark-event is in music objects of type TextMarkEvent (page 38).

Accepted by: Text_mark_engraver (page 452).

1.2.89 text-script-event

Music event type text-script-event is in music objects of type TextScriptEvent (page 39).

Accepted by: Text_engraver (page 452).

1.2.90 text-span-event

Music event type text-span-event is in music objects of type TextSpanEvent (page 39).

Accepted by: Text_spanner_engraver (page 453).

1.2.91 tie-event

Music event type tie-event is in music objects of type TieEvent (page 39).

Accepted by: Drum_note_performer (page 419), Note_performer (page 439), Tie_engraver (page 453), and Tie_performer (page 453).

1.2.92 time-signature-event

Music event type time-signature-event is in music objects of type TimeSignatureEvent (page 40).

Accepted by: Time_signature_engraver (page 454), and Time_signature_performer (page 454).

1.2.93 tremolo-event

Music event type tremolo-event is in music objects of type TremoloEvent (page 41).

Accepted by: Stem_engraver (page 450).

1.2.94 tremolo-span-event

Music event type tremolo-span-event is in music objects of type TremoloSpanEvent (page 42).

Accepted by: Chord_tremolo_engraver (page 413).

1.2.95 trill-span-event

Music event type trill-span-event is in music objects of type TrillSpanEvent (page 43).

Accepted by: Trill_spanner_engraver (page 455).

1.2.96 tuplet-span-event

Music event type tuplet-span-event is in music objects of type TupletSpanEvent (page 43).

Accepted by: Stem_engraver (page 450), and Tuplet_engraver (page 456).

1.2.97 una-corda-event

Music event type una-corda-event is in music objects of type UnaCordaEvent (page 43).

Accepted by: Piano_pedal_engraver (page 442), and Piano_pedal_performer (page 443).

1.2.98 unisono-event

Music event type unisono-event is in music objects of type UnisonoEvent (page 45).

Not accepted by any engraver or performer.

1.2.99 volta-repeat-end-event

Music event type volta-repeat-end-event is in music objects of type VoltaRepeatEndEvent (page 46).

Accepted by: Divisio_engraver (page 417), Lyric_repeat_count_engraver (page 432), Repeat_acknowledge_engraver (page 444), and Signum_repetitionis_engraver (page 446).

1.2.100 volta-repeat-start-event

Music event type volta-repeat-start-event is in music objects of type VoltaRepeatStartEvent (page 46).

Accepted by: Divisio_engraver (page 417), and Repeat_acknowledge_engraver (page 444).

1.2.101 volta-span-event

Music event type volta-span-event is in music objects of type VoltaSpanEvent (page 47).

Accepted by: Bar_engraver (page 404), and Volta_engraver (page 457).

1.2.102 vowel-transition-event

Music event type vowel-transition-event is in music objects of type VowelTransitionEvent (page 48).

Accepted by: Hyphen_engraver (page 427).

1.3 Music properties

`absolute-octave` (integer)

The absolute octave for an octave check note.

`alteration` (number)

Alteration for figured bass.

`alteration-bracket` (boolean)

Put brackets around bass figure alteration.

`alternative-dir` (direction)

Indicates that an `alternative-event` is the first (-1), middle (0), or last (1) of group of alternate endings.

`alternative-number` (non-negative, exact integer)

The index of the current `\alternative` element, starting from one.

`articulation-type` (symbol)

Key for script definitions alist.

`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`.

`bar-type` (string)

The type of bar line to create, e.g., "|"

`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-tag (symbol)

Tag identifying the musical scope of a context change. The change applies to the nearest enclosing music with this tag.

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.

color (color)

The color of a highlight.

context (context)

The context to which an event is sent.

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 (non-negative, exact 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.

`fine-folded` (boolean)

True in a fine-event that is issued from within a folded repeat (segno or volta).

`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.

`horizontal-direction` (direction)

This is RIGHT for `\textMark`, and LEFT for `\textEndMark`.

`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` (non-negative, exact integer)

Sequence number of a mark. 1 is first.

`last-pitch` (pitch)

The last pitch after relativization.

`length` (moment)

The endpoint of this music. This property is unhappily named in that it does not account for any initial grace notes: the full length of the music is `length` minus the start time. A value of `INF-MOMENT` indicates indefinite length.

`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 negative.

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 instantiated instead of a score.

page-turn-permission (symbol)

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

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-body-start-moment (moment)

In a *D.S.* event, the moment of the segno.

repeat-count (non-negative, exact integer)

The number of times to perform a \repeat.

return-count (non-negative, exact integer)

The number of times to perform a *D.S.*

search-direction (direction)

Limits the scope of \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 scm/define-music-types.scm.

string-number (integer)

The number of the string in a StringNumberEvent.

symbol (symbol)

Grob name to perform an override or revert on.

tags (list)

List of symbols that for denoting extra details, e.g., \tag #'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 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-depth (non-negative, exact integer)

The depth in the repeat structure.

volta-numbers (number list)

Volte to which this music applies.

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): Arpeggio (page 483), InstrumentName (page 559), SpanBarStub (page 627), StaffGrouper (page 630), SystemStartBar (page 644), SystemStartBrace (page 645), SystemStartBracket (page 645), SystemStartSquare (page 646), and VerticalAlignment (page 669).

This context sets the following properties:

- Revert grob property extra-spacing-width in DynamicText (page 539),
- Set context property instrumentName to '().
- Set context property localAlterations to #f.
- Set context property localAlterations to '().
- Set context property shortInstrumentName to '().
- Set context property systemStartDelimiter to 'SystemStartBracket.
- Set context property topLevelAlignment to #f.
- Set grob property extra-spacing-width in DynamicText (page 539), to #f.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Staff (page 287).

Context ChoirStaff can contain ChoirStaff (page 66), ChordNames (page 95), Devnull (page 108), DrumStaff (page 108), Dynamics (page 127), FiguredBass (page 132), FretBoards (page 133), GrandStaff (page 136), GregorianTranscriptionLyrics (page 138), GregorianTranscriptionStaff (page 140), KievanStaff (page 176), Lyrics (page 199), MensuralStaff (page 202), NoteNames (page 226), OneStaff (page 230), PetrucciStaff (page 231), PianoStaff (page 255), RhythmicStaff (page 257), Staff (page 287), StaffGroup (page 300), TabStaff (page 341), VaticanaLyrics (page 364), and VaticanaStaff (page 366).

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

Instrument_name_engraver (page 427)

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 items (clef, key signature, etc.).

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): InstrumentName (page 559).

Output_property_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 49),

Span_arpeggio_engraver (page 448)

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): Arpeggio (page 483).

Span_bar_stub_engraver (page 448)

Make stubs for span bars in all contexts that the span bars cross.

This engraver creates the following layout object(s): SpanBarStub (page 627).

System_start_delimiter_engraver (page 450)

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 items (clef, key signature, etc.).

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): SystemStartBar (page 644), SystemStartBrace (page 645), SystemStartBracket (page 645), and SystemStartSquare (page 646).

Vertical_align_engraver (page 456)

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): StaffGrouper (page 630), and VerticalAlignment (page 669).

2.1.2 ChordGrid

Creates chord grid notation. This context is always part of a ChordGridScore context.

This context also accepts commands for the following context(s): Staff (page 287).

This context creates the following layout object(s): BarLine (page 486), ChordSquare (page 509), DoublePercentRepeat (page 532), DoublePercentRepeatCounter (page 534), GridChordName (page 553), PercentRepeat (page 601), PercentRepeatCounter (page 602), StaffSymbol (page 632), SystemStartBar (page 644), SystemStartBrace (page 645), SystemStartBracket (page 645), SystemStartSquare (page 646), and VerticalAxisGroup (page 670).

This context sets the following properties:

- Set grob property font-size in BarLine (page 486), to 3.
- Set grob property hair-thickness in BarLine (page 486), to 2.
- Set grob property kern in BarLine (page 486), to 5.
- Set grob property line-positions in StaffSymbol (page 632), to :
'(-13.5 13.5)
- Set grob property thickness in StaffSymbol (page 632), to 2.
- Set grob property thickness in SystemStartBar (page 644), to 2.

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):

Alteration_glyph_engraver (page 402)

Set the glyph-name-alist of all grobs having the accidental-switch-interface to the value of the context’s alterationGlyphs property, when defined.

Properties (read)

alterationGlyphs (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., -1/2 for flat. This applies to all grobs that can print accidentals.

Axis_group_engraver (page 404)

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 items (clef, key signature, etc.).

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): VerticalAxisGroup (page 670).

Bar_engraver (page 404)

Create bar lines for various commands, including `\bar`.

If `forbidBreakBetweenBarLines` is true, allow line breaks at bar lines only.

Music types accepted: `ad-hoc-jump-event` (page 48), `caesura-event` (page 50), `coda-mark-event` (page 50), `dal-segno-event` (page 51), `fine-event` (page 51), `section-event` (page 56), `segno-mark-event` (page 56), and `volta-span-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...'`.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|.'`.

`endRepeatBarType` (string)

Bar line to insert at the end of a `\repeat volta`. The default is `':|.'`.

`endRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S'`.

`fineBarType` (string)

Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'|.'`.

`fineSegnoBarType` (string)
 Bar line to insert where an in-staff segno coincides with `\fine`. The default is `'|.S'`.

`fineStartRepeatSegnoBarType` (string)
 Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `'|.S.|:.'`.

`forbidBreakBetweenBarLines` (boolean)
 If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)
 Bar line to insert at a measure boundary.

`repeatCommands` (list)
 A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`
 End a repeated section.

`start-repeat`
 Start a repeated section.

`volta text`
 If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`sectionBarType` (string)
 Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`segnoBarType` (string)
 Bar line to insert at an in-staff segno. The default is `'S'`.

`segnoStyle` (symbol)
 A symbol that indicates how to print a segno: `bar-line` or `mark`.

`startRepeatBarType` (string)
 Bar line to insert at the start of a `\repeat volta`. The default is `'.|:.'`.

`startRepeatSegnoBarType` (string)
 Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is `'S.|:.'`.

`underlyingRepeatBarType` (string)
 Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`whichBar` (string)
 The current bar line type, or `'()` if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

Properties (write)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): `BarLine` (page 486).

`Chord_square_engraver` (page 413)

Engrave chord squares in chord grids.

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `ChordSquare` (page 509).

`Current_chord_text_engraver` (page 416)

Catch note and rest events and generate the appropriate chord text using `chordNameFunction`. Actually creating a chord name grob is left to other engravers.

Music types accepted: `general-rest-event` (page 52), and `note-event` (page 54),

Properties (read)

`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.

`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)

`currentChordCause` (stream event)

Event cause of the chord that should be created in this time step (if any).

`currentChordText` (markup)

In contexts printing chord names, this is at any point of time the markup that will be put in the chord name.

`Double_percent_repeat_engraver` (page 418)

Make double measure repeats.

Music types accepted: `double-percent-event` (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): DoublePercentRepeat (page 532), and DoublePercentRepeatCounter (page 534).

Grid_chord_name_engraver (page 426)

Read currentChordText to create chord names adapted for typesetting within a chord grid.

Properties (read)

currentChordCause (stream event)

Event cause of the chord that should be created in this time step (if any).

currentChordText (markup)

In contexts printing chord names, this is at any point of time the markup that will be put in the chord name.

currentCommandColumn (graphical (layout) object)

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

This engraver creates the following layout object(s): GridChordName (page 553).

Output_property_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 49),

Percent_repeat_engraver (page 441)

Make whole measure repeats.

Music types accepted: percent-event (page 55),

Properties (read)

countPercentRepeats (boolean)

If set, produce counters for percent repeats.

currentCommandColumn (graphical (layout) object)

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

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): `PercentRepeat` (page 601), and `PercentRepeatCounter` (page 602).

`Staff_symbol_engraver` (page 449)

Create the constellation of five (default) staff lines.

Music types accepted: `staff-span-event` (page 57),

This engraver creates the following layout object(s): `StaffSymbol` (page 632).

`System_start_delimiter_engraver` (page 450)

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 items (clef, key signature, etc.).

`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): `SystemStartBar` (page 644), `SystemStartBrace` (page 645), `SystemStartBracket` (page 645), and `SystemStartSquare` (page 646).

2.1.3 ChordGridScore

Top-level context replacing `Score` in chord grid notation. Compared to `Score`, it uses proportional notation, and has a few other settings like removing bar numbers.

This context also accepts commands for the following context(s): `Score` (page 263), and `Timing` (page 263).

This context creates the following layout object(s): `BreakAlignGroup` (page 500), `BreakAlignment` (page 501), `CenteredBarNumberLineSpanner` (page 507), `CodaMark` (page 515), `ControlPoint` (page 519), `ControlPolygon` (page 520), `Footnote` (page 549), `GraceSpacing` (page 553), `JumpScript` (page 561), `LeftEdge` (page 571), `MetronomeMark` (page 585), `NonMusicalPaperColumn` (page 593), `PaperColumn` (page 599), `Parentheses` (page 600), `RehearsalMark` (page 607), `SectionLabel` (page 614), `SegnoMark` (page 616), `SpacingSpanner` (page 625), `StaffGroupier` (page 630), `TextMark` (page 649), `VerticalAlignment` (page 669), `VoltaBracket` (page 673), and `VoltaBracketSpanner` (page 674).

This context sets the following properties:

- Set context property `additionalPitchPrefix` to "".
- Set context property `aDueText` to "a2".
- Set context property `alterationGlyphs` to #f.
- Set context property `alternativeRestores` to:


```
'(measurePosition
  measureLength
  measureStartNow
  lastChord)
```
- Set context property `associatedVoiceType` to 'Voice.

- Set context property autoAccidentals to:
`'(Staff #<procedure 7f3394a0f920 at ice-9/eval.scm:339:13 (a b c)>)`
- Set context property autoBeamCheck to default-auto-beam-check.
- Set context property autoBeaming to #t.
- Set context property autoCautionaries to '().
- Set context property barCheckSynchronize to #f.
- Set context property barNumberFormatter to robust-bar-number-function.
- Set context property barNumberVisibility to first-bar-number-invisible-and-no-parenthesized-bar-numbers.
- Set context property beamHalfMeasure to #t.
- Set context property breathMarkDefinitions to:
`'((altcomma
 (text #<procedure musicglyph-markup (a b c)>
 "scripts.raltcomma"))
 (caesura
 (text #<procedure musicglyph-markup (a b c)>
 "scripts.caesura.straight"))
 (chantdoublebar
 (extra-spacing-width -1.0 . 0.0)
 (stencil
 .
 #<procedure ly:breathing-sign::finalis (>)>
 (Y-offset . 0.0))
 (chantfullbar
 (extra-spacing-width -1.0 . 0.0)
 (stencil
 .
 #<procedure ly:breathing-sign::divisio-maxima (>)>
 (Y-offset . 0.0))
 (chanthalfbar
 (extra-spacing-height
 .
 #<procedure item::extra-spacing-height-including-staff (a)>>
 (extra-spacing-width -1.0 . 0.0)
 (stencil
 .
 #<procedure ly:breathing-sign::divisio-maior (>)>
 (Y-offset . 0.0))
 (chantquarterbar
 (extra-spacing-height
 .
 #<procedure item::extra-spacing-height-including-staff (a)>>
 (extra-spacing-width -1.0 . 0.0)
 (stencil
 .
 #<procedure ly:breathing-sign::divisio-minima (>)>))
 (comma (text #<procedure musicglyph-markup (a b c)>
 "scripts.rcomma"))
 (curvedcaesura
 (text #<procedure musicglyph-markup (a b c)>`

```

    "scripts.caesura.curved"))
(outsidecomma
  (outside-staff-priority . 40)
  (text #<procedure musicglyph-markup (a b c)>
    "scripts.rcomma"))
(spacer (text #<procedure null-markup (a b)>))
(tickmark
  (outside-staff-priority . 40)
  (text #<procedure musicglyph-markup (a b c)>
    "scripts.tickmark"))
(upbow (outside-staff-priority . 40)
  (text #<procedure musicglyph-markup (a b c)>
    "scripts.upbow"))
(varcomma
  (text #<procedure musicglyph-markup (a b c)>
    "scripts.rvarcomma"))

```

- Set context property breathMarkType to 'comma.
- Set context property caesuraType to:

```
'((breath . caesura))
```

- Set context property centerBarNumbers to #f.
- Set context property chordNameExceptions to:

```

'(((#<Pitch e' > #<Pitch gis' >)
  #<procedure line-markup (a b c)>
  ("+"))
((#<Pitch ees' > #<Pitch ges' >)
  #<procedure line-markup (a b c)>
  ((#<procedure line-markup (a b c)>
    ((#<procedure fontsize-markup (a b c d)> 2 "°")))))
((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >)
  #<procedure line-markup (a b c)>
  ((#<procedure super-markup (a b c)> "ø"))))
((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >)
  #<procedure concat-markup (a b c)>
  ((#<procedure line-markup (a b c)>
    ((#<procedure fontsize-markup (a b c d)> 2 "°"))
    (#<procedure super-markup (a b c)> "7"))))
((#<Pitch e' >
  #<Pitch g' >
  #<Pitch b' >
  #<Pitch fis'' >)
  #<procedure line-markup (a b c)>
  ((#<procedure super-markup (a b c)> "lyd"))))
((#<Pitch e' >
  #<Pitch g' >
  #<Pitch bes' >
  #<Pitch des'' >
  #<Pitch ees'' >
  #<Pitch fis'' >
  #<Pitch aes'' >)
  #<procedure line-markup (a b c)>
  ((#<procedure super-markup (a b c)> "alt"))))

```

```

((#<Pitch g' >)
 #<procedure line-markup (a b c)>
 ((#<procedure super-markup (a b c)> "5"))))
((#<Pitch g' > #<Pitch c' ' >)
 #<procedure line-markup (a b c)>
 ((#<procedure super-markup (a b c)> "5"))))

```

- Set context property `chordNameFunction` to `ignatzek-chord-names`.
- Set context property `chordNameLowercaseMinor` to `#f`.
- Set context property `chordNameSeparator` to:
'(#<procedure hspace-markup (a b c)> 0.5)
- Set context property `chordNoteNamer` to `'()`.
- Set context property `chordPrefixSpacer` to `0`.
- Set context property `chordRootNamer` to `note-name->markup`.
- Set context property `clefGlyph` to `"clefs.G"`.
- Set context property `clefPosition` to `-2`.
- Set context property `clefTranspositionFormatter` to `clef-transposition-markup`.
- Set context property `codaMarkFormatter` to `#<procedure 7f3393da0ee0 at ice-9/eval.scm:336:13 (a b)>`.
- Set context property `completionFactor` to `unity-if-multimeasure`.
- Set context property `crescendoSpanner` to `'hairpin`.
- Set context property `cueClefTranspositionFormatter` to `clef-transposition-markup`.
- Set context property `dalSegnoTextFormatter` to `format-dal-segno-text`.
- Set context property `decrescendoSpanner` to `'hairpin`.
- Set context property `doubleRepeatBarType` to `":...:"`.
- Set context property `doubleRepeatSegnoBarType` to `":|.S.|:"`.
- Set context property `drumStyleTable` to `#<hash-table 7f3394b088c0 29/61>`.
- Set context property `endRepeatBarType` to `":|."`.
- Set context property `endRepeatSegnoBarType` to `":|.S."`.
- Set context property `explicitClefVisibility` to:
`##(#t #t #t)`
- Set context property `explicitCueClefVisibility` to:
`##(#f #t #t)`
- Set context property `explicitKeySignatureVisibility` to:
`##(#t #t #t)`
- Set context property `extendersOverRests` to `#t`.
- Set context property `extraNatural` to `#t`.
- Set context property `figuredBassAlterationDirection` to `-1`.
- Set context property `figuredBassFormatter` to `format-bass-figure`.
- Set context property `figuredBassLargeNumberAlignment` to `0`.
- Set context property `figuredBassPlusDirection` to `-1`.
- Set context property `figuredBassPlusStrokedAlist` to:
'((2 . "figbass.twoplus")
 (4 . "figbass.fourplus")
 (5 . "figbass.fiveplus")

- ```

(6 . "figbass.sixstroked")
(7 . "figbass.sevenstroked")
(9 . "figbass.ninestroked"))

```
- Set context property fineBarType to "|. ".
  - Set context property fineSegnoBarType to "|.S".
  - Set context property fineStartRepeatSegnoBarType to "|.S.|:".
  - Set context property fineText to "Fine".
  - Set context property fingeringOrientations to:  
'(up down)
  - Set context property firstClef to #t.
  - Set context property forbidBreakBetweenBarLines to #t.
  - Set context property 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 context property harmonicAccidentals to #t.
  - Set context property highStringOne to #t.
  - Set context property initialTimeSignatureVisibility to:  
#(#f #t #t)
  - Set context property instrumentTransposition to #<Pitch c' >.
  - Set context property keepAliveInterfaces to:  
'(bass-figure-interface  
chord-name-interface  
cluster-beacon-interface  
dynamic-interface  
fret-diagram-interface  
lyric-syllable-interface  
note-head-interface  
tab-note-head-interface  
lyric-interface  
percent-repeat-interface  
stanza-number-interface)
  - Set context 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 context property lyricMelismaAlignment to -1.
- Set context property majorSevenSymbol to:  

```
'(#<procedure line-markup (a b c)>
 ((#<procedure fontsize-markup (a b c d)>
 -3
 (#<procedure triangle-markup (a b c)> #f))))
```
- Set context property measureBarType to "|".
- Set context property melismaBusyProperties to:  

```
'(melismaBusy
 slurMelismaBusy
 tieMelismaBusy
 beamMelismaBusy
 completionBusy)
```
- Set context property metronomeMarkFormatter to format-metronome-markup.
- Set context property middleCClefPosition to -6.
- Set context property middleCPosition to -6.
- Set context property minorChordModifier to:  

```
'(#<procedure simple-markup (a b c)> "m")
```
- Set context property noChordSymbol to:  

```
'(#<procedure simple-markup (a b c)> "N.C.")
```
- Set context property noteNameFunction to note-name-markup.
- Set context property noteNameSeparator to "/".
- Set context property noteToFretFunction to determine-frets.

- Set context property partCombineTextsOnNote to #t.
- Set context property pedalSostenutoStrings to:  
`'("Sost. Ped." "*Sost. Ped." "*")`
- Set context property pedalSostenutoStyle to 'mixed.
- Set context property pedalSustainStrings to:  
`'("Ped." "*Ped." "*")`
- Set context property pedalSustainStyle to 'text.
- Set context property pedalUnaCordaStrings to:  
`'("una corda" "" "tre corde")`
- Set context property pedalUnaCordaStyle to 'text.
- Set context property predefinedDiagramTable to #f.
- Set context property printAccidentalNames to #t.
- Set context property printKeyCancellation to #t.
- Set context property printOctaveNames to #f.
- Set context property printPartCombineTexts to #t.
- Set context property proportionalNotationDuration to #<Mom 1/4>.
- Set context property quotedCueEventTypes to:  
`'(note-event  
rest-event  
tie-event  
beam-event  
tuplet-span-event  
tremolo-event)`
- Set context property quotedEventTypes to:  
`'(StreamEvent)`
- Set context property rehearsalMarkFormatter to #<procedure 7f3393db7140 at ice-9/eval.scm:336:13 (a b)>.
- Set context property rehearsalMark to 1.
- Set context property repeatCountVisibility to all-repeat-counts-visible.
- Set context property restNumberThreshold to 1.
- Set context property scriptDefinitions to:  
`'((accent  
  (avoid-slur . around)  
  (padding . 0.2)  
  (script-stencil feta "sforzato" . "sforzato")  
  (side-relative-direction . -1))  
(accentus  
  (script-stencil feta "uaccentus" . "uaccentus")  
  (side-relative-direction . -1)  
  (avoid-slur . ignore)  
  (padding . 0.2)  
  (quantize-position . #t)  
  (script-priority . -100)  
  (direction . 1))  
(altcomma  
  (script-stencil feta "laltcomma" . "raltcomma"))`

```

 (quantize-position . #t)
 (padding . 0.2)
 (avoid-slur . ignore)
 (direction . 1))
(circulus
 (script-stencil feta "circulus" . "circulus")
 (side-relative-direction . -1)
 (avoid-slur . ignore)
 (padding . 0.2)
 (quantize-position . #t)
 (script-priority . -100)
 (direction . 1))
(coda (script-stencil feta "coda" . "coda")
 (padding . 0.2)
 (avoid-slur . outside)
 (direction . 1))
(comma (script-stencil feta "lcomma" . "rcomma")
 (quantize-position . #t)
 (padding . 0.2)
 (avoid-slur . ignore)
 (direction . 1))
(downbow
 (script-stencil feta "downbow" . "downbow")
 (padding . 0.2)
 (skyline-horizontal-padding . 0.2)
 (avoid-slur . around)
 (direction . 1)
 (script-priority . 150))
(downmordent
 (script-stencil
 feta
 "downmordent"
 .
 "downmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
(downprall
 (script-stencil feta "downprall" . "downprall")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
(espressivo
 (avoid-slur . around)
 (padding . 0.2)
 (script-stencil feta "espr" . "espr")
 (side-relative-direction . -1))
(fermata
 (script-stencil feta "dfermata" . "ufermata")
 (padding . 0.4)
 (avoid-slur . around)
 (script-priority . 4000))

```



```

 (direction . 1))
(flageolet
 (script-stencil feta "flageolet" . "flageolet")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
(halfopen
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil feta "halfopen" . "halfopen")
 (direction . 1))
(halfopenvertical
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil
 feta
 "halfopenvertical"
 .
 "halfopenvertical")
 (direction . 1))
(haydnturn
 (script-stencil feta "haydnturn" . "haydnturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (direction . 1))
(henzelongfermata
 (script-stencil
 feta
 "dhenzelongfermata"
 .
 "uhenzelongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (script-priority . 4000)
 (direction . 1))
(henzeshortfermata
 (script-stencil
 feta
 "dhenzeshortfermata"
 .
 "uhenzeshortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (script-priority . 4000)
 (direction . 1))
(ictus (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 . 0.4)
 (avoid-slur . around)
 (script-priority . 4000)
 (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))
(outsidecomma
 (avoid-slur . around)
 (direction . 1)
 (padding . 0.2)
 (script-stencil feta "lcomma" . "rcomma"))
(portato
 (script-stencil feta "uportato" . "dportato")
 (avoid-slur . around)
 (padding . 0.45)
 (side-relative-direction . -1))
(prall (script-stencil feta "prall" . "prall")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))

```

```

(pralldown
 (script-stencil feta "pralldown" . "pralldown")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
(prallmordent
 (script-stencil
 feta
 "prallmordent"
 .
 "prallmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
(prallprall
 (script-stencil feta "prallprall" . "prallprall")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
(prallup
 (script-stencil feta "prallup" . "prallup")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
(reverseturn
 (script-stencil
 feta
 "reverseturn"
 .
 "reverseturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (direction . 1))
(rheel (script-stencil feta "dpedalheel" . "dpedalheel")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
(rtoe (script-stencil feta "dpedaltoe" . "dpedaltoe")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1))
(segno (script-stencil feta "segno" . "segno")
 (padding . 0.2)
 (avoid-slur . outside)
 (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 . 0.4)
 (avoid-slur . around)
 (script-priority . 4000)
 (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)
 (script-priority . -50)
 (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 . 0.4)
(avoid-slur . around)
(script-priority . 4000)
(direction . 1))
(veryshortfermata
 (script-stencil
 feta
 "dveryshortfermata"
 .
 "uveryshortfermata")
(padding . 0.4)
(avoid-slur . around)
(script-priority . 4000)
(direction . 1)))

```

- Set context property sectionBarType to "||".
- Set context property segnoBarType to "S".
- Set context property segnoMarkFormatter to format-segno-mark-considering-bar-lines.
- Set context property segnoStyle to 'mark.
- Set context property slashChordSeparator to:  
'(#<procedure simple-markup (a b c)> "/" )
- Set context property soloIIIText to "Solo II".
- Set context property soloText to "Solo".
- Set context property startRepeatBarType to ".|:".
- Set context property startRepeatSegnoBarType to "S.|:".
- Set context property stringNumberOrientations to:  
'(up down)
- Set context property stringOneTopmost to #t.
- Set context property stringTunings to:  
'(#<Pitch e' >  
#<Pitch b >  
#<Pitch g >  
#<Pitch d >  
#<Pitch a, >  
#<Pitch e, >)
- Set context property strokeFingerOrientations to:  
'(right)
- Set context property subdivideBeams to #f.

- This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Staff (page 287).

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

Help beams avoid colliding with notes and clefs in other voices.

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): `BreakAlignGroup` (page 500), `BreakAlignment` (page 501), and `LeftEdge` (page 571).

`Centered_bar_number_align_engraver` (page 412)

Group measure-centered bar numbers in a `CenteredBarNumberLineSpanner` so they end up on the same vertical position.

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s):

`CenteredBarNumberLineSpanner` (page 507).

`Concurrent_hairpin_engraver` (page 415)

Collect concurrent hairpins.

`Footnote_engraver` (page 423)

Create footnote texts.

This engraver creates the following layout object(s): `Footnote` (page 549).

`Grace_spacing_engraver` (page 426)

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): `GraceSpacing` (page 553).

`Jump_engraver` (page 428)

This engraver creates instructions such as *D.C.* and *Fine*, placing them vertically outside the set of staves given in the `stavesFound` context property.

If `Jump_engraver` is added or moved to another context, `Staff_collecting_engraver` (page 448), also needs to be there so that marks appear at the intended Y location.

Music types accepted: `ad-hoc-jump-event` (page 48), `dal-segno-event` (page 51), and `fine-event` (page 51),

Properties (read)

`codaMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

`codaMarkFormatter` (procedure)

A procedure that creates a coda mark (which in conventional *D.S. al Coda* form indicates the start of the alternative endings), taking as arguments the mark sequence number and the context. It should return a markup object.

`dalSegnoTextFormatter` (procedure)

Format a jump instruction such as *D.S.*

The first argument is the context.



The second argument is the number of times the instruction is performed.

The third argument is a list of three markups: *start-markup*, *end-markup*, and *next-markup*.

If *start-markup* is #f, the form is *da capo*; otherwise the form is *dal segno* and *start-markup* is the sign at the start of the repeated section.

If *end-markup* is not #f, it is either the sign at the end of the main body of the repeat, or it is a *Fine* instruction. When it is a *Fine* instruction, *next-markup* is #f.

If *next-markup* is not #f, it is the mark to be jumped to after performing the body of the repeat, e.g., Coda.

`finalFineTextVisibility` (boolean)

Whether `\fine` at the written end of the music should create a *Fine* instruction.

`fineText` (markup)

The text to print at `\fine`.

`segnoMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

`segnoMarkFormatter` (procedure)

A procedure that creates a segno (which conventionally indicates the start of a repeated section), taking as arguments the mark sequence number and the context. It should return a markup object.

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `JumpScript` (page 561).

`Mark_engraver` (page 432)

This engraver creates rehearsal marks, segno and coda marks, and section labels.

`Mark_engraver` creates marks, formats them, and places them vertically outside the set of staves given in the `stavesFound` context property.

If `Mark_engraver` is added or moved to another context, `Staff_collecting_engraver` (page 448), also needs to be there so that marks appear at the intended Y location.

By default, `Mark_engravers` in multiple contexts create a common sequence of marks chosen by the Score-level `Mark_tracking_translator` (page 433). If independent sequences are desired, multiple `Mark_tracking_translators` must be used.

Properties (read)

`codaMarkFormatter` (procedure)

A procedure that creates a coda mark (which in conventional *D.S. al Coda* form indicates the start of the alternative endings), taking as arguments the mark sequence number and the context. It should return a markup object.

`currentPerformanceMarkEvent` (stream event)

The coda, section, or segno mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`currentRehearsalMarkEvent` (stream event)

The ad-hoc or rehearsal mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`rehearsalMarkFormatter` (procedure)

A procedure taking as arguments the context and the sequence number of the rehearsal mark. It should return the formatted mark as a markup object.

`segnoMarkFormatter` (procedure)

A procedure that creates a segno (which conventionally indicates the start of a repeated section), taking as arguments the mark sequence number and the context. It should return a markup object.

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `CodaMark` (page 515), `RehearsalMark` (page 607), `SectionLabel` (page 614), and `SegnoMark` (page 616).

`Mark_tracking_translator` (page 433)

This translator chooses which marks `Mark_engraver` should engrave.

Music types accepted: `ad-hoc-mark-event` (page 49), `coda-mark-event` (page 50), `rehearsal-mark-event` (page 55), `section-label-event` (page 56), and `segno-mark-event` (page 56),

Properties (read)

`codaMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

`rehearsalMark` (integer)

The next rehearsal mark to print.

`segnoMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

Properties (write)

`codaMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

`currentPerformanceMarkEvent` (stream event)

The coda, section, or segno mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`currentRehearsalMarkEvent` (stream event)

The ad-hoc or rehearsal mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`rehearsalMark` (integer)

The next rehearsal mark to print.

segnoMarkCount (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

Metronome\_mark\_engraver (page 436)

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 2.2.135 [Staff\_collecting\_engraver], page 448.

Music types accepted: tempo-change-event (page 58),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): MetronomeMark (page 585).

Output\_property\_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 49),

Paper\_column\_engraver (page 440)

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: break-event (page 50), and label-event (page 52),

Properties (read)

forbidBreak (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

Properties (write)

currentCommandColumn (graphical (layout) object)

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

`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, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to `#t` when an event forcing a line break was heard.

This engraver creates the following layout object(s): `NonMusicalPaperColumn` (page 593), and `PaperColumn` (page 599).

`Parenthesis_engraver` (page 441)

Parenthesize objects whose `parenthesize` property is `#t`.

This engraver creates the following layout object(s): `Parentheses` (page 600).

`Repeat_acknowledge_engraver` (page 444)

This translator adds entries to `repeatCommands` for events generated by `\\repeat volta`.

Music types accepted: `volta-repeat-end-event` (page 59), and `volta-repeat-start-event` (page 59),

Properties (write)

`repeatCommands` (list)

A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'(start-repeat)` may be given as `'(start-repeat)`.

`end-repeat`

End a repeated section.

`start-repeat`

Start a repeated section.

`volta text`

If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`Show_control_points_engraver` (page 446)

Create grobs to visualize control points of Bézier curves (ties and slurs) for ease of tweaking.

This engraver creates the following layout object(s): `ControlPoint` (page 519), and `ControlPolygon` (page 520).

`Spacing_engraver` (page 447)

Make a `SpacingSpanner` and do bookkeeping of shortest starting and playing notes.

Music types accepted: `spacing-section-event` (page 56),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `SpacingSpanner` (page 625).

`Spanner_tracking_engraver` (page 448)

Helper for creating spanners attached to other spanners. If a spanner has the `sticky-grob-interface`, the engraver tracks the spanner contained in its `sticky-host` object. When the host ends, the sticky spanner attached to it has its end announced too.

`Staff_collecting_engraver` (page 448)

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.

`Stanza_number_align_engraver` (page 450)

This engraver ensures that stanza numbers are neatly aligned.

`Text_mark_engraver` (page 452)

Engraves arbitrary textual marks.

Music types accepted: `text-mark-event` (page 58),

Properties (read)

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `TextMark` (page 649).

`Timing_translator` (page 454)

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`.

Music types accepted: `alternative-event` (page 49), `bar-event` (page 49), and `fine-event` (page 51),

Properties (read)

`alternativeNumberingStyle` (symbol)

The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to `numbers` to reset the bar number at each alternative, or set to `numbers-with-letters` to reset and also include letter suffixes.

`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 incremented at every bar line.

`internalBarNumber` (integer)

Contains the current barnumber. This property is used for internal time-keeping, 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)

`alternativeNumber` (non-negative, exact integer)

When set, the index of the current \alternative element, starting from one. Not set outside of alternatives. Note the distinction from volta number: an alternative may pertain to multiple volte.

`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 incremented at every bar line.

`internalBarNumber` (integer)

Contains the current barnumber. This property is used for internal time-keeping, 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.

`measureStartNow` (boolean)

True at the beginning of a measure.

`timeSignatureFraction` (fraction, as pair)

A pair of numbers, signifying the time signature. For example, '(4 . 4)' is a 4/4 time signature.

`Tweak_engraver` (page 456)

Read the tweaks property from the originating event, and set properties.

`Vertical_align_engraver` (page 456)

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): `StaffGrouper` (page 630), and `VerticalAlignment` (page 669).

`Volta_engraver` (page 457)

Make volta brackets.

Music types accepted: `dal-segno-event` (page 51), `fine-event` (page 51), and `volta-span-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`repeatCommands` (list)

A list of commands related to volta-style repeats. In general, each element is a list, '*command args...*', but a command with no arguments may be abbreviated to a symbol; e.g., '*((start-repeat))*' may be given as '*(start-repeat)*'.

`end-repeat`

End a repeated section.

`start-repeat`

Start a repeated section.

`volta text`

If *text* is markup, start a volta bracket with that label; if *text* is #f, end a volta bracket.

`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): `VoltaBracket` (page 673), and `VoltaBracketSpanner` (page 674).

#### 2.1.4 ChordNames

Typesets chord names.

This context also accepts commands for the following context(s): `Staff` (page 287).

This context creates the following layout object(s): `ChordName` (page 508), `StaffSpacing` (page 632), and `VerticalAxisGroup` (page 670).

This context sets the following properties:

- Set grob property `font-size` in `Parentheses` (page 600), to 1.5.
- Set grob property `nonstaff-nonstaff-spacing.padding` in `VerticalAxisGroup` (page 670), to 0.5.
- Set grob property `nonstaff-relatedstaff-spacing.padding` in `VerticalAxisGroup` (page 670), to 0.5.
- Set grob property `remove-empty` in `VerticalAxisGroup` (page 670), to #t.
- Set grob property `remove-first` in `VerticalAxisGroup` (page 670), to #t.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 670), 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):

`Alteration_glyph_engraver` (page 402)

Set the `glyph-name-alist` of all grobs having the `accidental-switch-interface` to the value of the context’s `alterationGlyphs` property, when defined.

Properties (read)

`alterationGlyphs` (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g.,  $-1/2$  for flat. This applies to all grobs that can print accidentals.

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Chord_name_engraver` (page 412)

Read `currentChordText` to create chord names.

Properties (read)

`chordChanges` (boolean)

Only show changes in chords scheme?

`currentChordCause` (stream event)

Event cause of the chord that should be created in this time step (if any).

`currentChordText` (markup)

In contexts printing chord names, this is at any point of time the markup that will be put in the chord name.

`lastChord` (markup)

Last chord, used for detecting chord changes.

Properties (write)

`lastChord` (markup)

Last chord, used for detecting chord changes.



This engraver creates the following layout object(s): `ChordName` (page 508).

`Current_chord_text_engraver` (page 416)

Catch note and rest events and generate the appropriate chord text using `chordNameFunction`. Actually creating a chord name grob is left to other engravers.

Music types accepted: `general-rest-event` (page 52), and `note-event` (page 54),

Properties (read)

`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.

`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)

`currentChordCause` (stream event)

Event cause of the chord that should be created in this time step (if any).

`currentChordText` (markup)

In contexts printing chord names, this is at any point of time the markup that will be put in the chord name.

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Separating_line_group_engraver` (page 446)

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)

Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)

True if `currentCommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 632).

### 2.1.5 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` (page 390).

This context creates the following layout object(s): `Arpeggio` (page 483), `Beam` (page 495), `BendAfter` (page 497), `BreathingSign` (page 502), `ClusterSpanner` (page 514), `ClusterSpannerBeacon` (page 515), `CombineTextScript` (page 517), `Dots` (page 531), `DoublePercentRepeat` (page 532), `DoublePercentRepeatCounter` (page 534), `DoubleRepeatSlash` (page 535), `DynamicLineSpanner` (page 538), `DynamicText` (page 539), `DynamicTextSpanner` (page 541), `FingerGlideSpanner` (page 544), `Fingering` (page 545), `Flag` (page 548), `Glissando` (page 552), `Hairpin` (page 555), `InstrumentSwitch` (page 560), `LaissezVibrerTie` (page 569), `LaissezVibrerTieColumn` (page 570), `LigatureBracket` (page 573), `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), `MultiMeasureRestText` (page 591), `NoteColumn` (page 595), `NoteHead` (page 596), `NoteSpacing` (page 597), `PercentRepeat` (page 601), `PercentRepeatCounter` (page 602), `PhrasingSlur` (page 604), `RepeatSlash` (page 608), `RepeatTie` (page 609), `RepeatTieColumn` (page 610), `Rest` (page 611), `Script` (page 612), `ScriptColumn` (page 613), `Slur` (page 621), `Stem` (page 634), `StemStub` (page 636), `StemTremolo` (page 636), `StringNumber` (page 637), `StrokeFinger` (page 639), `TextScript` (page 651), `TextSpanner` (page 653), `Tie` (page 654), `TieColumn` (page 656), `TrillPitchAccidental` (page 659), `TrillPitchGroup` (page 660), `TrillPitchHead` (page 661), `TrillPitchParentheses` (page 662), `TrillSpanner` (page 662), `TupletBracket` (page 664), `TupletNumber` (page 665), and `VoiceFollower` (page 672).

This context sets the following properties:

- Set context property `fontSize` to -4.
- Set grob property `beam-thickness` in `Beam` (page 495), to 0.35.
- Set grob property `beam-thickness` in `StemTremolo` (page 636), to 0.35.
- Set grob property `ignore-ambitus` in `NoteHead` (page 596), to #t.
- Set grob property `length-fraction` in `Beam` (page 495), to 0.6299605249474366.
- Set grob property `length-fraction` in `Stem` (page 634), to 0.6299605249474366.

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):

`Arpeggio_engraver` (page 403)

Generate an Arpeggio symbol.

Music types accepted: `arpeggio-event` (page 49),

This engraver creates the following layout object(s): `Arpeggio` (page 483).

`Auto_beam_engraver` (page 403)

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 2.2.141 [`Stem_engraver`], page 450, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted: `beam-forbid-event` (page 49),

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): `Beam` (page 495).

`Beam_engraver` (page 408)

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 49),

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): `Beam` (page 495).

`Bend_engraver` (page 410)

Create fall spanners.

Music types accepted: `bend-after-event` (page 49),

Properties (read)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`currentCommandColumn` (graphical (layout) object)

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

`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): `BendAfter` (page 497).

Breathing\_sign\_engraver (page 411)

Notate breath marks.

Music types accepted: breathing-event (page 50),

Properties (read)

breathMarkType (symbol)

The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 502).

Chord\_tremolo\_engraver (page 413)

Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 59),

This engraver creates the following layout object(s): Beam (page 495).

Cluster\_spanner\_engraver (page 414)

Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 50),

This engraver creates the following layout object(s): ClusterSpanner (page 514), and ClusterSpannerBeacon (page 515).

Dots\_engraver (page 418)

Create Section 3.1.43 [Dots], page 531, objects for Section 3.2.118 [rhythmic-head-interface], page 736s.

This engraver creates the following layout object(s): Dots (page 531).

Double\_percent\_repeat\_engraver (page 418)

Make double measure repeats.

Music types accepted: double-percent-event (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): DoublePercentRepeat (page 532), and DoublePercentRepeatCounter (page 534).

Dynamic\_align\_engraver (page 420)

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): `DynamicLineSpanner` (page 538).

`Dynamic_engraver` (page 420)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 48), `break-dynamic-span-event` (page 50), and `span-dynamic-event` (page 56),

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): `DynamicText` (page 539), `DynamicTextSpanner` (page 541), and `Hairpin` (page 555).

`Finger_glide_engraver` (page 422)

Engraver to print a line between two Fingering grobs.

Music types accepted: `note-event` (page 54),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 544).

`Fingering_engraver` (page 423)

Create fingering scripts.

Music types accepted: `fingering-event` (page 51),

This engraver creates the following layout object(s): `Fingering` (page 545).

`Font_size_engraver` (page 423)

Put `fontSize` into font-size grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 423)

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, except if explicitly requested by the user.

`Glissando_engraver` (page 424)

Engrave glissandi.

Music types accepted: `glissando-event` (page 52),

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): `Glissando` (page 552).

`Grace_auto_beam_engraver` (page 425)

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: `beam-forbid-event` (page 49),

Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 495).

`Grace_beam_engraver` (page 425)

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: `beam-event` (page 49),

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): `Beam` (page 495).

`Grace_engraver` (page 425)

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.

Grob\_pq\_engraver (page 426)

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.).

Instrument\_switch\_engraver (page 428)

Create a cue text for taking instrument.

This engraver is deprecated.

Properties (read)

instrumentCueName (markup)

The name to print if another instrument is to be taken.

This property is deprecated

This engraver creates the following layout object(s): InstrumentSwitch (page 560).

Laissez\_vibrer\_engraver (page 431)

Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 52),

This engraver creates the following layout object(s): LaissezVibrerTie (page 569), and LaissezVibrerTieColumn (page 570).

Ligature\_bracket\_engraver (page 431)

Handle Ligature\_events by engraving Ligature brackets.

Music types accepted: ligature-event (page 52),

This engraver creates the following layout object(s): LigatureBracket (page 573).

Multi\_measure\_rest\_engraver (page 437)

Engrave multi-measure rests that are produced with 'R'. It reads measureStartNow and internalBarNumber to determine what number to print over the Section 3.1.88 [MultiMeasureRest], page 587.

Music types accepted: multi-measure-articulation-event (page 53),

multi-measure-rest-event (page 53), and multi-measure-text-event (page 53),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

internalBarNumber (integer)

Contains the current barnumber. This property is used for internal time-keeping, among others by the Accidental\_engraver.

measureStartNow (boolean)

True at the beginning of a measure.

`restNumberThreshold` (number)

If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), and `MultiMeasureRestText` (page 591).

`New_fingering_engraver` (page 437)

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): `Fingering` (page 545), `Script` (page 612), `StringNumber` (page 637), and `StrokeFinger` (page 639).

`Note_head_line_engraver` (page 438)

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): `VoiceFollower` (page 672).

`Note_heads_engraver` (page 438)

Generate note heads.

Music types accepted: `note-event` (page 54),

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): `NoteHead` (page 596).

`Note_spacing_engraver` (page 439)

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

This engraver creates the following layout object(s): `NoteSpacing` (page 597).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),



**Part\_combine\_engraver** (page 441)

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

Music types accepted: note-event (page 54), and part-combine-event (page 55),  
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): **CombineTextScript** (page 517).

**Percent\_repeat\_engraver** (page 441)

Make whole measure repeats.

Music types accepted: percent-event (page 55),

Properties (read)

**countPercentRepeats** (boolean)

If set, produce counters for percent repeats.

**currentCommandColumn** (graphical (layout) object)

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

**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): **PercentRepeat** (page 601), and **PercentRepeatCounter** (page 602).

**Phrasing\_slur\_engraver** (page 442)

Print phrasing slurs. Similar to Section 2.2.126 [**Slur\_engraver**], page 447.

Music types accepted: note-event (page 54), and phrasing-slur-event (page 55),

This engraver creates the following layout object(s): **PhrasingSlur** (page 604).

**Pitched\_trill\_engraver** (page 443)

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): **TrillPitchAccidental** (page 659), **TrillPitchGroup** (page 660), **TrillPitchHead** (page 661), and **TrillPitchParentheses** (page 662).

Repeat\_tie\_engraver (page 444)

Create repeat ties.

Music types accepted: repeat-tie-event (page 55),

This engraver creates the following layout object(s): RepeatTie (page 609), and RepeatTieColumn (page 610).

Rest\_engraver (page 444)

Engrave rests.

Music types accepted: rest-event (page 55),

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): Rest (page 611).

Rhythmic\_column\_engraver (page 445)

Generate NoteColumn, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): NoteColumn (page 595).

Script\_column\_engraver (page 445)

Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.

This engraver creates the following layout object(s): ScriptColumn (page 613).

Script\_engraver (page 445)

Handle note scripted articulations.

Music types accepted: articulation-event (page 49),

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): Script (page 612).

Slash\_repeat\_engraver (page 447)

Make beat repeats.

Music types accepted: repeat-slash-event (page 55),

This engraver creates the following layout object(s): DoubleRepeatSlash (page 535), and RepeatSlash (page 608).

Slur\_engraver (page 447)

Build slur grobs from slur events.

Music types accepted: note-event (page 54), and slur-event (page 56),

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): Slur (page 621).

`Spanner_break_forbid_engraver` (page 448)

Forbid breaks in certain spanners.

`Stem_engraver` (page 450)

Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 58), and `tuplet-span-event` (page 59),

Properties (read)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`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`.

This engraver creates the following layout object(s): `Flag` (page 548), `Stem` (page 634), `StemStub` (page 636), and `StemTremolo` (page 636).

`Text_engraver` (page 452)

Create text scripts.

Music types accepted: `text-script-event` (page 58),

This engraver creates the following layout object(s): `TextScript` (page 651).

`Text_spanner_engraver` (page 453)

Create text spanner from an event.

Music types accepted: `text-span-event` (page 58),

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): `TextSpanner` (page 653).

`Tie_engraver` (page 453)

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 58),

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): Tie (page 654), and TieColumn (page 656).

Trill\_spanner\_engraver (page 455)

Create trill spanners.

Music types accepted: trill-span-event (page 59),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): TrillSpanner (page 662).

Tuplet\_engraver (page 456)

Catch tuplet events and generate appropriate bracket.

Music types accepted: tuplet-span-event (page 59),

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): TupletBracket (page 664), and TupletNumber (page 665).

### 2.1.6 Devnull

Silently discards all musical information given to this context.

This context also accepts commands for the following context(s): Staff (page 287), and Voice (page 390).

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.

### 2.1.7 DrumStaff

Handles typesetting for percussion.

This context also accepts commands for the following context(s): Staff (page 287).

This context creates the following layout object(s): BarLine (page 486), BassFigure (page 491), BassFigureAlignment (page 492), BassFigureAlignmentPositioning (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), BassFigureLine (page 494), BreathingSign (page 502), CaesuraScript (page 505), Clef (page 510), ClefModifier (page 513), CueClef (page 521), CueEndClef (page 524), DotColumn (page 531), FingeringColumn (page 547), InstrumentName (page 559), LedgerLineSpanner (page 570), NoteCollision (page 594), RestCollision (page 612), ScriptColumn (page 613), ScriptRow (page 614), SostenuitoPedalLineSpanner (page 624), StaffEllipsis (page 628), StaffHighlight (page 631), StaffSpacing (page 632),

StaffSymbol (page 632), SustainPedalLineSpanner (page 641), TimeSignature (page 657), UnaCordaPedalLineSpanner (page 667), and VerticalAxisGroup (page 670).

This context sets the following properties:

- Set context property clefGlyph to "clefs.percussion".
- Set context property clefPosition to 0.
- Set context property createSpacing to #t.
- Set context property ignoreFiguredBassRest to #f.
- Set context property instrumentName to '().
- Set context property localAlterations to '().
- Set context property ottavationMarkups to:
 

```
'((4 . "29")
 (3 . "22")
 (2 . "15")
 (1 . "8")
 (-1 . "8")
 (-2 . "15")
 (-3 . "22")
 (-4 . "29"))
```
- Set context property shortInstrumentName to '().
- Set grob property staff-padding in Script (page 612), to 0.75.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type DrumVoice (page 118).

Context DrumStaff can contain CueVoice (page 98), DrumVoice (page 118), and NullVoice (page 228).

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

Alteration\_glyph\_engraver (page 402)

Set the glyph-name-alist of all grobs having the accidental-switch-interface to the value of the context's alterationGlyphs property, when defined.

Properties (read)

alterationGlyphs (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., -1/2 for flat. This applies to all grobs that can print accidentals.

Axis\_group\_engraver (page 404)

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 items (clef, key signature, etc.).

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): `VerticalAxisGroup` (page 670).

`Bar_engraver` (page 404)

Create bar lines for various commands, including `\bar`.

If `forbidBreakBetweenBarLines` is true, allow line breaks at bar lines only.

Music types accepted: `ad-hoc-jump-event` (page 48), `caesura-event` (page 50), `coda-mark-event` (page 50), `dal-segno-event` (page 51), `fine-event` (page 51), `section-event` (page 56), `segno-mark-event` (page 56), and `volta-span-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

`((bar-line . bar-type)`

`(breath . breath-type)`

`(scripts . script-type...)`

`(underlying-bar-line . bar-type))`

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...'`.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|.'`.

`endRepeatBarType` (string)

Bar line to insert at the end of a `\repeat volta`. The default is `':|..'`.

`endRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S.'`.

`fineBarType` (string)  
 Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'|. '`.

`fineSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with `\fine`. The default is `'|.S'`.

`fineStartRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `'|.S.|: '`.

`forbidBreakBetweenBarLines` (boolean)  
 If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)  
 Bar line to insert at a measure boundary.

`repeatCommands` (list)  
 A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`  
 End a repeated section.

`start-repeat`  
 Start a repeated section.

`volta text`  
 If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`sectionBarType` (string)  
 Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`segnoBarType` (string)  
 Bar line to insert at an in-staff segno. The default is `'S'`.

`segnoStyle` (symbol)  
 A symbol that indicates how to print a segno: `bar-line` or `mark`.

`startRepeatBarType` (string)  
 Bar line to insert at the start of a `\repeat volta`. The default is `'.|: '`.

`startRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is `'S.|: '`.

`underlyingRepeatBarType` (string)  
 Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`whichBar` (string)

The current bar line type, or '()' if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

Properties (write)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): `BarLine` (page 486).

`Caesura_engraver` (page 411)

Notate a short break in sound that does not shorten the previous note.

Depending on the result of passing the value of `caesuraType` through `caesuraTypeTransform`, this engraver may create a `BreathingSign` with `CaesuraScript` grobs aligned to it, or it may create `CaesuraScript` grobs and align them to a `BarLine`.

If this engraver observes a `BarLine`, it calls `caesuraTypeTransform` again with the new information, and if necessary, recreates its grobs.

Music types accepted: `caesura-event` (page 50),

Properties (read)

`breathMarkDefinitions` (list)

The description of breath marks. This is used by the `Breathing_sign_engraver`. See `scm/breath.scm` for more information.

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.



The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`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): `BreathingSign` (page 502), and `CaesuraScript` (page 505).

`Clef_engraver` (page 413)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `Clef` (page 510), and `ClefModifier` (page 513).

`Collision_engraver` (page 414)

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): `NoteCollision` (page 594).

`Cue_clef_engraver` (page 416)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `ClefModifier` (page 513), `CueClef` (page 521), and `CueEndClef` (page 524).

`Dot_column_engraver` (page 418)

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): `DotColumn` (page 531).

`Figured_bass_engraver` (page 421)

Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 49), and `rest-event` (page 55),

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): BassFigure (page 491), BassFigureAlignment (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), and BassFigureLine (page 494).

Figured\_bass\_position\_engraver (page 422)

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

BassFigureAlignmentPositioning (page 492).

Fingering\_column\_engraver (page 422)

Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.

This engraver creates the following layout object(s): FingeringColumn (page 547).

Font\_size\_engraver (page 423)

Put fontSize into font-size grob property.

Properties (read)

fontSize (number)

The relative size of all grobs in a context.

Grob\_pq\_engraver (page 426)

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.).

Instrument\_name\_engraver (page 427)

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 items (clef, key signature, etc.).

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): `InstrumentName` (page 559).
- `Ledger_line_engraver` (page 431)  
 Create the spanner to draw ledger lines, and notices objects that need ledger lines.  
 This engraver creates the following layout object(s): `LedgerLineSpanner` (page 570).
- `Merge_mmrest_numbers_engraver` (page 435)  
 Engraver to merge multi-measure rest numbers in multiple voices.  
 This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.
- `Non_musical_script_column_engraver` (page 438)  
 Find potentially colliding non-musical scripts and put them into a `ScriptColumn` object; that will fix the collisions.  
 This engraver creates the following layout object(s): `ScriptColumn` (page 613).
- `Output_property_engraver` (page 439)  
 Apply a procedure to any grob acknowledged.  
 Music types accepted: `apply-output-event` (page 49),
- `Piano_pedal_align_engraver` (page 442)  
 Align piano pedal symbols and brackets.  
 Properties (read)  
     `currentCommandColumn` (graphical (layout) object)  
         Grob that is X-parent to all current breakable items (clef, key signature, etc.).
- This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 624), `SustainPedalLineSpanner` (page 641), and `UnaCordaPedalLineSpanner` (page 667).
- `Pure_from_neighbor_engraver` (page 443)  
 Coordinates items that get their pure heights from their neighbors.
- `Rest_collision_engraver` (page 444)  
 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): `RestCollision` (page 612).
- `Script_row_engraver` (page 445)  
 Determine order in horizontal side position elements.  
 This engraver creates the following layout object(s): `ScriptRow` (page 614).
- `Separating_line_group_engraver` (page 446)  
 Generate objects for computing spacing parameters.  
 Properties (read)  
     `createSpacing` (boolean)  
         Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

- `hasStaffSpacing` (boolean)  
True if `currentCommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 632).

`Skip_typesetting_engraver` (page 446)  
Create a `StaffEllipsis` when `skipTypesetting` is used.

Properties (read)

- `skipTypesetting` (boolean)  
If true, no typesetting is done, speeding up the interpretation phase.  
Useful for debugging large scores.

This engraver creates the following layout object(s): `StaffEllipsis` (page 628).

`Staff_collecting_engraver` (page 448)  
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_highlight_engraver` (page 449)  
Highlights music passages.  
Music types accepted: `staff-highlight-event` (page 57),

Properties (read)

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

This engraver creates the following layout object(s): `StaffHighlight` (page 631).

`Staff_symbol_engraver` (page 449)  
Create the constellation of five (default) staff lines.  
Music types accepted: `staff-span-event` (page 57),  
This engraver creates the following layout object(s): `StaffSymbol` (page 632).

`Time_signature_engraver` (page 454)  
Create a Section 3.1.147 [TimeSignature], page 657, whenever `timeSignatureFraction` changes.  
Music types accepted: `time-signature-event` (page 58),

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): `TimeSignature` (page 657).

### 2.1.8 DrumVoice

A voice on a percussion staff.

This context also accepts commands for the following context(s): Voice (page 390).

This context creates the following layout object(s): Beam (page 495), BendAfter (page 497), BreathingSign (page 502), CombineTextScript (page 517), Dots (page 531), DoublePercentRepeat (page 532), DoublePercentRepeatCounter (page 534), DoubleRepeatSlash (page 535), DynamicLineSpanner (page 538), DynamicText (page 539), DynamicTextSpanner (page 541), FingerGlideSpanner (page 544), Flag (page 548), Hairpin (page 555), InstrumentSwitch (page 560), LaissezVibrerTie (page 569), LaissezVibrerTieColumn (page 570), MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), MultiMeasureRestText (page 591), NoteColumn (page 595), NoteHead (page 596), NoteSpacing (page 597), PercentRepeat (page 601), PercentRepeatCounter (page 602), PhrasingSlur (page 604), RepeatSlash (page 608), RepeatTie (page 609), RepeatTieColumn (page 610), Rest (page 611), Script (page 612), ScriptColumn (page 613), Slur (page 621), Stem (page 634), StemStub (page 636), StemTremolo (page 636), TextScript (page 651), TextSpanner (page 653), Tie (page 654), TieColumn (page 656), TrillPitchAccidental (page 659), TrillPitchGroup (page 660), TrillPitchHead (page 661), TrillPitchParentheses (page 662), TrillSpanner (page 662), TupletBracket (page 664), and TupletNumber (page 665).

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):

Auto\_beam\_engraver (page 403)

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 2.2.141 [Stem\_engraver], page 450, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 49),

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): Beam (page 495).

Beam\_engraver (page 408)

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: beam-event (page 49),

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): Beam (page 495).

Bend\_engraver (page 410)

Create fall spanners.

Music types accepted: bend-after-event (page 49),

Properties (read)

currentBarLine (graphical (layout) object)

Set to the BarLine that Bar\_engraver has created in the current timestep.

currentCommandColumn (graphical (layout) object)

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

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): BendAfter (page 497).

Breathing\_sign\_engraver (page 411)

Notate breath marks.

Music types accepted: breathing-event (page 50),

Properties (read)

breathMarkType (symbol)

The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 502).

Chord\_tremolo\_engraver (page 413)

Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 59),

This engraver creates the following layout object(s): Beam (page 495).

Dots\_engraver (page 418)

Create Section 3.1.43 [Dots], page 531, objects for Section 3.2.118 [rhythmic-head-interface], page 736s.

This engraver creates the following layout object(s): Dots (page 531).

Double\_percent\_repeat\_engraver (page 418)

Make double measure repeats.

Music types accepted: double-percent-event (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): DoublePercentRepeat (page 532), and DoublePercentRepeatCounter (page 534).

Drum\_notes\_engraver (page 419)

Generate drum note heads.

Music types accepted: note-event (page 54),

Properties (read)

drumStyleTable (hash table)

A hash table which maps drums to layout settings. Predefined values: 'drums-style', 'agostini-drums-style', 'weinberg-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): NoteHead (page 596), and Script (page 612).

Dynamic\_align\_engraver (page 420)

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): DynamicLineSpanner (page 538).

Dynamic\_engraver (page 420)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: absolute-dynamic-event (page 48), break-dynamic-span-event (page 50), and span-dynamic-event (page 56),



## 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): `DynamicText` (page 539), `DynamicTextSpanner` (page 541), and `Hairpin` (page 555).

`Finger_glide_engraver` (page 422)

Engraver to print a line between two Fingering grobs.

Music types accepted: note-event (page 54),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 544).

`Font_size_engraver` (page 423)

Put `fontSize` into font-size grob property.

## Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 423)

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, except if explicitly requested by the user.

`Grace_auto_beam_engraver` (page 425)

Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeam, just like setting the context property ‘autoBeaming’ to ##f.

Music types accepted: beam-forbid-event (page 49),

## Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s): Beam (page 495).

Grace\_beam\_engraver (page 425)

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: beam-event (page 49),

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): Beam (page 495).

Grace\_engraver (page 425)

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.

Grob\_pq\_engraver (page 426)

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.).

Instrument\_switch\_engraver (page 428)

Create a cue text for taking instrument.

This engraver is deprecated.

Properties (read)

instrumentCueName (markup)

The name to print if another instrument is to be taken.

This property is deprecated

This engraver creates the following layout object(s): InstrumentSwitch (page 560).

`Laissez_vibrer_engraver` (page 431)

Create laissez vibrer items.

Music types accepted: `laissez-vibrer-event` (page 52),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 569), and `LaissezVibrerTieColumn` (page 570).

`Multi_measure_rest_engraver` (page 437)

Engrave multi-measure rests that are produced with ‘R’. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.88 [`MultiMeasureRest`], page 587.

Music types accepted: `multi-measure-articulation-event` (page 53), `multi-measure-rest-event` (page 53), and `multi-measure-text-event` (page 53),  
Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`internalBarNumber` (integer)

Contains the current barnumber. This property is used for internal time-keeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)

True at the beginning of a measure.

`restNumberThreshold` (number)

If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), and `MultiMeasureRestText` (page 591).

`Note_spacing_engraver` (page 439)

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

This engraver creates the following layout object(s): `NoteSpacing` (page 597).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Part_combine_engraver` (page 441)

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

Music types accepted: `note-event` (page 54), and `part-combine-event` (page 55),

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): CombineTextScript (page 517).

Percent\_repeat\_engraver (page 441)

Make whole measure repeats.

Music types accepted: percent-event (page 55),

Properties (read)

countPercentRepeats (boolean)

If set, produce counters for percent repeats.

currentCommandColumn (graphical (layout) object)

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

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): PercentRepeat (page 601), and PercentRepeatCounter (page 602).

Phrasing\_slur\_engraver (page 442)

Print phrasing slurs. Similar to Section 2.2.126 [Slur\_engraver], page 447.

Music types accepted: note-event (page 54), and phrasing-slur-event (page 55),

This engraver creates the following layout object(s): PhrasingSlur (page 604).

Pitched\_trill\_engraver (page 443)

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): TrillPitchAccidental (page 659), TrillPitchGroup (page 660), TrillPitchHead (page 661), and TrillPitchParentheses (page 662).

Repeat\_tie\_engraver (page 444)

Create repeat ties.

Music types accepted: repeat-tie-event (page 55),

This engraver creates the following layout object(s): RepeatTie (page 609), and RepeatTieColumn (page 610).

Rest\_engraver (page 444)

Engrave rests.

Music types accepted: rest-event (page 55),

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): Rest (page 611).

Rhythmic\_column\_engraver (page 445)

Generate NoteColumn, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): NoteColumn (page 595).

`Script_column_engraver` (page 445)

Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 613).

`Script_engraver` (page 445)

Handle note scripted articulations.

Music types accepted: `articulation-event` (page 49),

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): `Script` (page 612).

`Slash_repeat_engraver` (page 447)

Make beat repeats.

Music types accepted: `repeat-slash-event` (page 55),

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 535), and `RepeatSlash` (page 608).

`Slur_engraver` (page 447)

Build slur grobs from slur events.

Music types accepted: `note-event` (page 54), and `slur-event` (page 56),

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): `Slur` (page 621).

`Spanner_break_forbid_engraver` (page 448)

Forbid breaks in certain spanners.

`Stem_engraver` (page 450)

Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 58), and `tuplet-span-event` (page 59),

Properties (read)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`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`.

This engraver creates the following layout object(s): `Flag` (page 548), `Stem` (page 634), `StemStub` (page 636), and `StemTremolo` (page 636).

`Text_engraver` (page 452)  
 Create text scripts.  
 Music types accepted: `text-script-event` (page 58),  
 This engraver creates the following layout object(s): `TextScript` (page 651).

`Text_spanner_engraver` (page 453)  
 Create text spanner from an event.  
 Music types accepted: `text-span-event` (page 58),  
 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): `TextSpanner` (page 653).

`Tie_engraver` (page 453)  
 Generate ties between note heads of equal pitch.  
 Music types accepted: `tie-event` (page 58),  
 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): `Tie` (page 654), and `TieColumn` (page 656).

`Trill_spanner_engraver` (page 455)  
 Create trill spanners.  
 Music types accepted: `trill-span-event` (page 59),  
 Properties (read)  
     `currentCommandColumn` (graphical (layout) object)  
         Grob that is X-parent to all current breakable items (clef, key signature, etc.).  
     `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): `TrillSpanner` (page 662).

`Tuplet_engraver` (page 456)  
 Catch tuplet events and generate appropriate bracket.  
 Music types accepted: `tuplet-span-event` (page 59),

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): `TupletBracket` (page 664), and `TupletNumber` (page 665).

### 2.1.9 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): `Staff` (page 287), and `Voice` (page 390).

This context creates the following layout object(s): `BarLine` (page 486), `DynamicLineSpanner` (page 538), `DynamicText` (page 539), `DynamicTextSpanner` (page 541), `Hairpin` (page 555), `PianoPedalBracket` (page 605), `Script` (page 612), `SostenutoPedal` (page 623), `SustainPedal` (page 640), `TextScript` (page 651), `TextSpanner` (page 653), `UnaCordaPedal` (page 666), and `VerticalAxisGroup` (page 670).

This context sets the following properties:

- Set context property `pedalSustainStrings` to:  
'("Ped." "\*"Ped." "\*")
- Set context property `pedalUnaCordaStrings` to:  
'("una corda" "" "tre corde")
- Set grob property `font-shape` in `TextScript` (page 651), to `'italic`.
- Set grob property `nonstaff-relatedstaff-spacing` in `VerticalAxisGroup` (page 670), to :  
'((basic-distance . 5) (padding . 0.5))
- Set grob property `outside-staff-priority` in `DynamicLineSpanner` (page 538), to `#f`.
- Set grob property `outside-staff-priority` in `DynamicText` (page 539), to `#f`.
- Set grob property `outside-staff-priority` in `Hairpin` (page 555), to `#f`.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 670), to `0`.
- Set grob property `Y-offset` in `DynamicLineSpanner` (page 538), 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):

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Bar_engraver` (page 404)

Create bar lines for various commands, including `\bar`.

If `forbidBreakBetweenBarLines` is true, allow line breaks at bar lines only.

Music types accepted: `ad-hoc-jump-event` (page 48), `caesura-event` (page 50), `coda-mark-event` (page 50), `dal-segno-event` (page 51), `fine-event` (page 51), `section-event` (page 56), `segno-mark-event` (page 56), and `volta-span-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...'`.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|.'`.

`endRepeatBarType` (string)

Bar line to insert at the end of a `\repeat volta`. The default is `':|..'`.



`endRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S'`.

`fineBarType` (string)  
 Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `|. '`.

`fineSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with `\fine`. The default is `|.S'`.

`fineStartRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `|.S.|:'`.

`forbidBreakBetweenBarLines` (boolean)  
 If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)  
 Bar line to insert at a measure boundary.

`repeatCommands` (list)  
 A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`  
 End a repeated section.

`start-repeat`  
 Start a repeated section.

`volta text`  
 If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`sectionBarType` (string)  
 Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `||'`.

`segnoBarType` (string)  
 Bar line to insert at an in-staff segno. The default is `S'`.

`segnoStyle` (symbol)  
 A symbol that indicates how to print a segno: bar-line or mark.

`startRepeatBarType` (string)  
 Bar line to insert at the start of a `\repeat volta`. The default is `.|:'`.

`startRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is `S.|:'`.

`underlyingRepeatBarType` (string)  
 Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in

mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is ‘||’.

`whichBar` (string)

The current bar line type, or ‘()’ if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

Properties (write)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): `BarLine` (page 486).

`Dynamic_align_engraver` (page 420)

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): `DynamicLineSpanner` (page 538).

`Dynamic_engraver` (page 420)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 48), `break-dynamic-span-event` (page 50), and `span-dynamic-event` (page 56),

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): `DynamicText` (page 539), `DynamicTextSpanner` (page 541), and `Hairpin` (page 555).

Font\_size\_engraver (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

Output\_property\_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

Piano\_pedal\_engraver (page 442)

Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 56), `sustain-event` (page 58), and `una-corda-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `PianoPedalBracket` (page 605), `SostenutoPedal` (page 623), `SustainPedal` (page 640), and `UnaCordaPedal` (page 666).

Script\_engraver (page 445)

Handle note scripted articulations.

Music types accepted: `articulation-event` (page 49),

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): `Script` (page 612).

Text\_engraver (page 452)

Create text scripts.

Music types accepted: text-script-event (page 58),

This engraver creates the following layout object(s): TextScript (page 651).

Text\_spanner\_engraver (page 453)

Create text spanner from an event.

Music types accepted: text-span-event (page 58),

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): TextSpanner (page 653).

### 2.1.10 FiguredBass

A context for printing a figured bass line.

This context creates the following layout object(s): BassFigure (page 491), BassFigureAlignment (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), BassFigureLine (page 494), StaffSpacing (page 632), and VerticalAxisGroup (page 670).

This context sets the following properties:

- Set grob property nonstaff-nonstaff-spacing.padding in VerticalAxisGroup (page 670), to 0.5.
- Set grob property nonstaff-relatedstaff-spacing.padding in VerticalAxisGroup (page 670), to 0.5.
- Set grob property remove-empty in VerticalAxisGroup (page 670), to #t.
- Set grob property remove-first in VerticalAxisGroup (page 670), to #t.
- Set grob property staff-affinity in VerticalAxisGroup (page 670), 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):

Axis\_group\_engraver (page 404)

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 items (clef, key signature, etc.).

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): `VerticalAxisGroup` (page 670).

`Figured_bass_engraver` (page 421)

Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 49), and `rest-event` (page 55),

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): `BassFigure` (page 491),

`BassFigureAlignment` (page 492), `BassFigureBracket` (page 493),

`BassFigureContinuation` (page 494), and `BassFigureLine` (page 494).

`Separating_line_group_engraver` (page 446)

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)

Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)

True if `currentCommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 632).

### 2.1.11 FretBoards

A context for displaying fret diagrams.

This context also accepts commands for the following context(s): `Staff` (page 287).

This context creates the following layout object(s): `FretBoard` (page 550),

`InstrumentName` (page 559), `StaffSpacing` (page 632), and `VerticalAxisGroup` (page 670).

This context sets the following properties:

- Set context property `handleNegativeFrets` to `'recalculate'`.
- Set context property `instrumentName` to `'()`.
- Set context property `predefinedDiagramTable` to `#<hash-table 7f3394be54a0 0/113>`.
- Set context property `restrainOpenStrings` to `#f`.
- Set context 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):

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Font_size_engraver` (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

`Fretboard_engraver` (page 424)

Generate fret diagram from one or more events of type `NoteEvent`.

Music types accepted: `fingering-event` (page 51), `note-event` (page 54), and `string-number-event` (page 58),

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): FretBoard (page 550).

`Instrument_name_engraver` (page 427)

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 items (clef, key signature, etc.).

`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): InstrumentName (page 559).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Separating_line_group_engraver` (page 446)

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)

Create StaffSpacing objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)

True if `currentCommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): StaffSpacing (page 632).

### 2.1.12 Global

Hard coded entry point for LilyPond. Usually not meant to be modified directly.

This context creates the following layout object(s): none.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Score (page 263).

Context Global can contain ChordGridScore (page 73), Score (page 263), and StandaloneRhythmScore (page 302).

### 2.1.13 GrandStaff

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): Arpeggio (page 483), InstrumentName (page 559), SpanBar (page 626), SpanBarStub (page 627), StaffGrouper (page 630), SystemStartBar (page 644), SystemStartBrace (page 645), SystemStartBracket (page 645), SystemStartSquare (page 646), and VerticalAlignment (page 669).

This context sets the following properties:

- Set context property instrumentName to '().
- Set context property localAlterations to #f.
- Set context property localAlterations to '().
- Set context property localAlterations to '().
- Set context property shortInstrumentName to '().
- Set context property systemStartDelimiter to 'SystemStartBrace.
- Set context property systemStartDelimiter to 'SystemStartBracket.
- Set context property topLevelAlignment to #f.
- Set grob property extra-spacing-width in DynamicText (page 539), to #f.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Staff (page 287).

Context GrandStaff can contain ChoirStaff (page 66), ChordNames (page 95), Devnull (page 108), DrumStaff (page 108), Dynamics (page 127), FiguredBass (page 132), FretBoards (page 133), GrandStaff (page 136), GregorianTranscriptionLyrics (page 138), GregorianTranscriptionStaff (page 140), KievanStaff (page 176), Lyrics (page 199), MensuralStaff (page 202), NoteNames (page 226), OneStaff (page 230), PetrucciStaff (page 231), PianoStaff (page 255), RhythmicStaff (page 257), Staff (page 287), StaffGroup (page 300), TabStaff (page 341), VaticanaLyrics (page 364), and VaticanaStaff (page 366).

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

Instrument\_name\_engraver (page 427)

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 items (clef, key signature, etc.).

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): `InstrumentName` (page 559).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Span_arpeggio_engraver` (page 448)

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): `Arpeggio` (page 483).

`Span_bar_engraver` (page 448)

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): `SpanBar` (page 626).

`Span_bar_stub_engraver` (page 448)

Make stubs for span bars in all contexts that the span bars cross.

This engraver creates the following layout object(s): `SpanBarStub` (page 627).

`System_start_delimiter_engraver` (page 450)

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 items (clef, key signature, etc.).

`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): `SystemStartBar` (page 644), `SystemStartBrace` (page 645), `SystemStartBracket` (page 645), and `SystemStartSquare` (page 646).

`Vertical_align_engraver` (page 456)

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): `StaffGrouper` (page 630), and `VerticalAlignment` (page 669).

### 2.1.14 GregorianTranscriptionLyrics

A lyrics context for notating Gregorian chant in modern style.

This context also accepts commands for the following context(s): `Lyrics` (page 199).

This context creates the following layout object(s): `InstrumentName` (page 559), `LyricExtender` (page 574), `LyricHyphen` (page 575), `LyricRepeatCount` (page 576), `LyricSpace` (page 578), `LyricText` (page 578), `StanzaNumber` (page 633), `VerticalAxisGroup` (page 670), and `VowelTransition` (page 675).

This context sets the following properties:

- Set context property `instrumentName` to `'()`.
- Set context property `lyricRepeatCountFormatter` to `#<procedure 7f33949758e0 at ice-9/eval.scm:336:13 (a b)>`.
- Set context property `searchForVoice` to `#f`.
- Set context property `shortInstrumentName` to `'()`.
- Set grob property `bar-extent` in `BarLine` (page 486), to :  
`'(-0.05 . 0.05)`
- Set grob property `font-size` in `InstrumentName` (page 559), to 1.0.
- Set grob property `nonstaff-nonstaff-spacing` in `VerticalAxisGroup` (page 670), to :  
`'((basic-distance . 0)  
  (minimum-distance . 2.8)  
  (padding . 0.2)  
  (stretchability . 0))`
- Set grob property `nonstaff-relatedstaff-spacing` in `VerticalAxisGroup` (page 670), to :  
`'((basic-distance . 5.5)  
  (padding . 0.5)  
  (stretchability . 1))`
- Set grob property `nonstaff-unrelatedstaff-spacing.padding` in `VerticalAxisGroup` (page 670), to 1.5.
- Set grob property `parent-alignment-X` in `LyricRepeatCount` (page 576), to 1.
- Set grob property `remove-empty` in `VerticalAxisGroup` (page 670), to `#t`.
- Set grob property `remove-first` in `VerticalAxisGroup` (page 670), to `#t`.
- Set grob property `self-alignment-Y` in `InstrumentName` (page 559), to `#f`.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 670), 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):

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Extender_engraver` (page 421)

Create lyric extenders.

Music types accepted: `completize-extender-event` (page 50), and `extender-event` (page 51),

## Properties (read)

`extendersOverRests` (boolean)

Whether to continue extenders as they cross a rest.

This engraver creates the following layout object(s): `LyricExtender` (page 574).

`Font_size_engraver` (page 423)

Put `fontSize` into `font-size` grob property.

## Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

`Hyphen_engraver` (page 427)

Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted: `hyphen-event` (page 52), and `vowel-transition-event` (page 59),

This engraver creates the following layout object(s): `LyricHyphen` (page 575), `LyricSpace` (page 578), and `VowelTransition` (page 675).

`Instrument_name_engraver` (page 427)

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 items (clef, key signature, etc.).

`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): InstrumentName (page 559).

Lyric\_engraver (page 431)

Engrave text for lyrics.

Music types accepted: lyric-event (page 53),

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): LyricText (page 578).

Lyric\_repeat\_count\_engraver (page 432)

Create repeat counts within lyrics for modern transcriptions of Gregorian chant.

Music types accepted: volta-repeat-end-event (page 59),

Properties (read)

lyricRepeatCountFormatter (procedure)

A procedure taking as arguments the context and the numeric repeat count. It should return the formatted repeat count as markup. If it does not return markup, no grob is created.

This engraver creates the following layout object(s): LyricRepeatCount (page 576).

Pure\_from\_neighbor\_engraver (page 443)

Coordinates items that get their pure heights from their neighbors.

Stanza\_number\_engraver (page 450)

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): StanzaNumber (page 633).

### 2.1.15 GregorianTranscriptionStaff

A staff for notating Gregorian chant in modern style.

This context also accepts commands for the following context(s): Staff (page 287).

This context creates the following layout object(s): Accidental (page 475),  
AccidentalCautionary (page 476), AccidentalPlacement (page 477),

AccidentalSuggestion (page 478), BarLine (page 486), BassFigure (page 491), BassFigureAlignment (page 492), BassFigureAlignmentPositioning (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), BassFigureLine (page 494), Clef (page 510), ClefModifier (page 513), CueClef (page 521), CueEndClef (page 524), Divisio (page 528), DotColumn (page 531), FingeringColumn (page 547), InstrumentName (page 559), KeyCancellation (page 563), KeySignature (page 566), LedgerLineSpanner (page 570), NoteCollision (page 594), OttavaBracket (page 598), PianoPedalBracket (page 605), RestCollision (page 612), ScriptColumn (page 613), ScriptRow (page 614), SostenuatoPedal (page 623), SostenuatoPedalLineSpanner (page 624), StaffEllipsis (page 628), StaffHighlight (page 631), StaffSpacing (page 632), StaffSymbol (page 632), SustainPedal (page 640), SustainPedalLineSpanner (page 641), UnaCordaPedal (page 666), UnaCordaPedalLineSpanner (page 667), and VerticalAxisGroup (page 670).

This context sets the following properties:

- Set context property autoAccidentals to:
 

```
'(Staff #<procedure 7f3394949b80 at ice-9/eval.scm:339:13 (a b c)>)
```
- Set context property autoCautionaries to '().
- Set context property caesuraTypeTransform to caesura-to-bar-line-or-divisio.
- Set context property caesuraType to:
 

```
'((breath . varcomma))
```
- Set context property createSpacing to #t.
- Set context property doubleRepeatBarType to "||".
- Set context property doubleRepeatSegnoBarType to "S-||".
- Set context property endRepeatBarType to "||".
- Set context property endRepeatSegnoBarType to "S-||".
- Set context property extraNatural to #f.
- Set context property fineBarType to "||".
- Set context property fineSegnoBarType to "S-||".
- Set context property fineStartRepeatSegnoBarType to "S-||".
- Set context property forbidBreakBetweenBarLines to #f.
- Set context property ignoreFiguredBassRest to #f.
- Set context property instrumentName to '().
- Set context property localAlterations to '().
- Set context property measureBarType to '().
- Set context property ottavationMarkups to:
 

```
'((4 . "29")
 (3 . "22")
 (2 . "15")
 (1 . "8")
 (-1 . "8")
 (-2 . "15")
 (-3 . "22")
 (-4 . "29"))
```
- Set context property printKeyCancellation to #f.
- Set context property sectionBarType to "||".
- Set context property segnoBarType to "S-||".

- Set context property `shortInstrumentName` to `'()`.
- Set context property `startRepeatBarType` to `"||"`.
- Set context property `startRepeatSegnoBarType` to `"S-||"`.
- Set context property `underlyingRepeatBarType` to `"||"`.
- Set grob property `extra-spacing-height` in `BreathingSign` (page 502), to `item::extra-spacing-height-including-staff`.
- Set grob property `extra-spacing-width` in `BreathingSign` (page 502), to `'(-1.0 . 0.0)`

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type `GregorianTranscriptionVoice` (page 153).

Context `GregorianTranscriptionStaff` can contain `CueVoice` (page 98), `GregorianTranscriptionVoice` (page 153), and `NullVoice` (page 228).

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

`Accidental_engraver` (page 401)

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.

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 time-keeping, 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): `Accidental` (page 475), `AccidentalCautionary` (page 476), `AccidentalPlacement` (page 477), and `AccidentalSuggestion` (page 478).

`Alteration_glyph_engraver` (page 402)

Set the `glyph-name-alist` of all grobs having the `accidental-switch-interface` to the value of the context's `alterationGlyphs` property, when defined.

Properties (read)

`alterationGlyphs` (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g.,  $-1/2$  for flat. This applies to all grobs that can print accidentals.

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Bar_engraver` (page 404)

Create bar lines for various commands, including `\bar`.

If `forbidBreakBetweenBarLines` is true, allow line breaks at bar lines only.

Music types accepted: `ad-hoc-jump-event` (page 48), `caesura-event` (page 50), `coda-mark-event` (page 50), `dal-segno-event` (page 51), `fine-event` (page 51), `section-event` (page 56), `segno-mark-event` (page 56), and `volta-span-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...'`.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|.'`.

`endRepeatBarType` (string)

Bar line to insert at the end of a `\repeat volta`. The default is `':|..'`.



`endRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S'`.

`fineBarType` (string)  
 Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `|. '`.

`fineSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with `\fine`. The default is `|.S'`.

`fineStartRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `|.S.|:'`.

`forbidBreakBetweenBarLines` (boolean)  
 If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)  
 Bar line to insert at a measure boundary.

`repeatCommands` (list)  
 A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`  
 End a repeated section.

`start-repeat`  
 Start a repeated section.

`volta text`  
 If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`sectionBarType` (string)  
 Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `||'`.

`segnoBarType` (string)  
 Bar line to insert at an in-staff segno. The default is `S'`.

`segnoStyle` (symbol)  
 A symbol that indicates how to print a segno: bar-line or mark.

`startRepeatBarType` (string)  
 Bar line to insert at the start of a `\repeat volta`. The default is `.|:'`.

`startRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is `S.|:'`.

`underlyingRepeatBarType` (string)  
 Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in

mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '| |'.

`whichBar` (string)

The current bar line type, or '()' if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

Properties (write)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): `BarLine` (page 486).

`Clef_engraver` (page 413)

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.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to `#t` when an event forcing a line break was heard.

`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): `Clef` (page 510), and `ClefModifier` (page 513).

`Collision_engraver` (page 414)

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): `NoteCollision` (page 594).

`Cue_clef_engraver` (page 416)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `ClefModifier` (page 513), `CueClef` (page 521), and `CueEndClef` (page 524).

`Divisio_engraver` (page 417)

Create divisiones: chant notation for points of breathing or caesura.

Music types accepted: `caesura-event` (page 50), `fine-event` (page 51), `section-event` (page 56), `volta-repeat-end-event` (page 59), and `volta-repeat-start-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

`((bar-line . bar-type)`

`(breath . breath-type)`

`(scripts . script-type...)`

`(underlying-bar-line . bar-type))`

specifying which breath mark, bar line, and scripts to create at \caesura. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

This engraver creates the following layout object(s): `Divisio` (page 528).

`Dot_column_engraver` (page 418)

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): `DotColumn` (page 531).

`Figured_bass_engraver` (page 421)

Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 49), and `rest-event` (page 55),

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): `BassFigure` (page 491),

`BassFigureAlignment` (page 492), `BassFigureBracket` (page 493),

`BassFigureContinuation` (page 494), and `BassFigureLine` (page 494).

`Figured_bass_position_engraver` (page 422)

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

`BassFigureAlignmentPositioning` (page 492).

`Fingering_column_engraver` (page 422)

Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 547).

`Font_size_engraver` (page 423)  
 Put `fontSize` into `font-size` grob property.  
 Properties (read)  
   `fontSize` (number)  
     The relative size of all grobs in a context.

`Grob_pq_engraver` (page 426)  
 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.).

`Instrument_name_engraver` (page 427)  
 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 items (clef, key signature, etc.).

`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): `InstrumentName` (page 559).

`Key_engraver` (page 429)  
 Engrave a key signature.  
 Music types accepted: `key-change-event` (page 52),  
 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.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to `#t` when an event forcing a line break was heard.

`keyAlterationOrder` (list)

A list of pairs that defines in what order alterations should be printed. The format of an entry is `(step . alter)`, where `step` is a number from 0 to 6 and `alter` from -1 (double flat) to 1 (double sharp), with exact rationals for alterations in between, e.g.,  $1/2$  for sharp.

`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): `KeyCancellation` (page 563), and `KeySignature` (page 566).

`Ledger_line_engraver` (page 431)

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 570).

`Merge_mmrest_numbers_engraver` (page 435)

Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

Non\_musical\_script\_column\_engraver (page 438)

Find potentially colliding non-musical scripts and put them into a ScriptColumn object; that will fix the collisions.

This engraver creates the following layout object(s): ScriptColumn (page 613).

Ottava\_spanner\_engraver (page 439)

Create a text spanner when the ottavation property changes.

Music types accepted: ottava-event (page 54),

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): OttavaBracket (page 598).

Output\_property\_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 49),

Piano\_pedal\_align\_engraver (page 442)

Align piano pedal symbols and brackets.

Properties (read)

currentCommandColumn (graphical (layout) object)

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

This engraver creates the following layout object(s): SostenutoPedalLineSpanner (page 624), SustainPedalLineSpanner (page 641), and UnaCordaPedalLineSpanner (page 667).

Piano\_pedal\_engraver (page 442)

Engrave piano pedal symbols and brackets.

Music types accepted: sostenuto-event (page 56), sustain-event (page 58), and una-corda-event (page 59),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): `PianoPedalBracket` (page 605), `SostenutoPedal` (page 623), `SustainPedal` (page 640), and `UnaCordaPedal` (page 666).

`Pure_from_neighbor_engraver` (page 443)

Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 444)

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): `RestCollision` (page 612).

`Script_row_engraver` (page 445)

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 614).

`Separating_line_group_engraver` (page 446)

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)

Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)

True if `currentCommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 632).

`Skip_typesetting_engraver` (page 446)

Create a `StaffEllipsis` when `skipTypesetting` is used.

Properties (read)

`skipTypesetting` (boolean)

If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

This engraver creates the following layout object(s): `StaffEllipsis` (page 628).

`Staff_collecting_engraver` (page 448)

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\_highlight\_engraver (page 449)  
Highlights music passages.  
Music types accepted: staff-highlight-event (page 57),  
Properties (read)

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

This engraver creates the following layout object(s): StaffHighlight (page 631).

Staff\_symbol\_engraver (page 449)  
Create the constellation of five (default) staff lines.  
Music types accepted: staff-span-event (page 57),  
This engraver creates the following layout object(s): StaffSymbol (page 632).

### 2.1.16 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 (page 390).

This context creates the following layout object(s): Arpeggio (page 483), Beam (page 495), BendAfter (page 497), BreathingSign (page 502), ClusterSpanner (page 514), ClusterSpannerBeacon (page 515), CombineTextScript (page 517), Dots (page 531), DoublePercentRepeat (page 532), DoublePercentRepeatCounter (page 534), DoubleRepeatSlash (page 535), DynamicLineSpanner (page 538), DynamicText (page 539), DynamicTextSpanner (page 541), Episema (page 543), FingerGlideSpanner (page 544), Fingering (page 545), Glissando (page 552), Hairpin (page 555), InstrumentSwitch (page 560), LaissezVibrerTie (page 569), LaissezVibrerTieColumn (page 570), LigatureBracket (page 573), MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), MultiMeasureRestText (page 591), NoteColumn (page 595), NoteHead (page 596), NoteSpacing (page 597), PercentRepeat (page 601), PercentRepeatCounter (page 602), PhrasingSlur (page 604), RepeatSlash (page 608), RepeatTie (page 609), RepeatTieColumn (page 610), Rest (page 611), Script (page 612), ScriptColumn (page 613), Slur (page 621), StringNumber (page 637), StrokeFinger (page 639), TextScript (page 651), TextSpanner (page 653), Tie (page 654), TieColumn (page 656), TrillPitchAccidental (page 659), TrillPitchGroup (page 660), TrillPitchHead (page 661), TrillPitchParentheses (page 662), TrillSpanner (page 662), TupletBracket (page 664), TupletNumber (page 665), and VoiceFollower (page 672).

This context sets the following properties:

- Set context property autoBeaming to #f.
- Set grob property transparent in LigatureBracket (page 573), to #t.

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):

- Arpeggio\_engraver (page 403)  
Generate an Arpeggio symbol.

Music types accepted: arpeggio-event (page 49),

This engraver creates the following layout object(s): Arpeggio (page 483).

Auto\_beam\_engraver (page 403)

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 2.2.141 [Stem\_engraver], page 450, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 49),

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): Beam (page 495).

Beam\_engraver (page 408)

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: beam-event (page 49),

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): Beam (page 495).

Bend\_engraver (page 410)

Create fall spanners.

Music types accepted: bend-after-event (page 49),

Properties (read)

- `currentBarLine` (graphical (layout) object)  
Set to the `BarLine` that `Bar_engraver` has created in the current timestep.
- `currentCommandColumn` (graphical (layout) object)  
Grob that is X-parent to all current breakable items (clef, key signature, etc.).
- `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): `BendAfter` (page 497).

`Breathing_sign_engraver` (page 411)

Notate breath marks.

Music types accepted: `breathing-event` (page 50),

Properties (read)

- `breathMarkType` (symbol)  
The type of `BreathingSign` to create at `\breathe`.

This engraver creates the following layout object(s): `BreathingSign` (page 502).

`Chord_tremolo_engraver` (page 413)

Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 59),

This engraver creates the following layout object(s): `Beam` (page 495).

`Cluster_spanner_engraver` (page 414)

Engrave a cluster using `Spanner` notation.

Music types accepted: `cluster-note-event` (page 50),

This engraver creates the following layout object(s): `ClusterSpanner` (page 514), and `ClusterSpannerBeacon` (page 515).

`Dots_engraver` (page 418)

Create Section 3.1.43 [Dots], page 531, objects for Section 3.2.118 [rhythmic-head-interface], page 736s.

This engraver creates the following layout object(s): `Dots` (page 531).

`Double_percent_repeat_engraver` (page 418)

Make double measure repeats.

Music types accepted: `double-percent-event` (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 532), and `DoublePercentRepeatCounter` (page 534).

`Dynamic_align_engraver` (page 420)

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): `DynamicLineSpanner` (page 538).

`Dynamic_engraver` (page 420)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 48), `break-dynamic-span-event` (page 50), and `span-dynamic-event` (page 56),

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): `DynamicText` (page 539), `DynamicTextSpanner` (page 541), and `Hairpin` (page 555).

`Episema_engraver` (page 421)

Create an *Editio Vaticana*-style episema line.

Music types accepted: `episema-event` (page 51),

This engraver creates the following layout object(s): `Episema` (page 543).

`Finger_glide_engraver` (page 422)

Engraver to print a line between two Fingering grobs.

Music types accepted: `note-event` (page 54),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 544).

Fingering\_engraver (page 423)

Create fingering scripts.

Music types accepted: `fingering-event` (page 51),

This engraver creates the following layout object(s): `Fingering` (page 545).

Font\_size\_engraver (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

Forbid\_line\_break\_engraver (page 423)

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, except if explicitly requested by the user.

Glissando\_engraver (page 424)

Engrave glissandi.

Music types accepted: `glissando-event` (page 52),

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): `Glissando` (page 552).

Grace\_auto\_beam\_engraver (page 425)

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: `beam-forbid-event` (page 49),

Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 495).

Grace\_beam\_engraver (page 425)

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: `beam-event` (page 49),

## 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): `Beam` (page 495).

`Grace_engraver` (page 425)

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.

`Grob_pq_engraver` (page 426)

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.).

`Instrument_switch_engraver` (page 428)

Create a cue text for taking instrument.

This engraver is deprecated.

## Properties (read)

`instrumentCueName` (markup)

The name to print if another instrument is to be taken.

This property is deprecated

This engraver creates the following layout object(s): `InstrumentSwitch` (page 560).

`Laissez_vibrer_engraver` (page 431)

Create `laissez vibrer` items.

Music types accepted: `laissez-vibrer-event` (page 52),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 569), and `LaissezVibrerTieColumn` (page 570).

**Ligature\_bracket\_engraver** (page 431)

Handle `Ligature_events` by engraving `Ligature` brackets.

Music types accepted: `ligature-event` (page 52),

This engraver creates the following layout object(s): `LigatureBracket` (page 573).

**Multi\_measure\_rest\_engraver** (page 437)

Engrave multi-measure rests that are produced with ‘R’. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.88 [`MultiMeasureRest`], page 587.

Music types accepted: `multi-measure-articulation-event` (page 53),

`multi-measure-rest-event` (page 53), and `multi-measure-text-event` (page 53),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`internalBarNumber` (integer)

Contains the current barnumber. This property is used for internal time-keeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)

True at the beginning of a measure.

`restNumberThreshold` (number)

If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), and `MultiMeasureRestText` (page 591).

**New\_fingering\_engraver** (page 437)

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): `Fingering` (page 545), `Script` (page 612), `StringNumber` (page 637), and `StrokeFinger` (page 639).

**Note\_head\_line\_engraver** (page 438)

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): `VoiceFollower` (page 672).

`Note_heads_engraver` (page 438)  
 Generate note heads.  
 Music types accepted: `note-event` (page 54),  
 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): `NoteHead` (page 596).

`Note_spacing_engraver` (page 439)  
 Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.  
 This engraver creates the following layout object(s): `NoteSpacing` (page 597).

`Output_property_engraver` (page 439)  
 Apply a procedure to any grob acknowledged.  
 Music types accepted: `apply-output-event` (page 49),

`Part_combine_engraver` (page 441)  
 Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.  
 Music types accepted: `note-event` (page 54), and `part-combine-event` (page 55),  
 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): `CombineTextScript` (page 517).

`Percent_repeat_engraver` (page 441)  
 Make whole measure repeats.  
 Music types accepted: `percent-event` (page 55),  
 Properties (read)

- `countPercentRepeats` (boolean)  
 If set, produce counters for percent repeats.
- `currentCommandColumn` (graphical (layout) object)  
 Grob that is X-parent to all current breakable items (clef, key signature, etc.).



`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): `PercentRepeat` (page 601), and `PercentRepeatCounter` (page 602).

`Phrasing_slur_engraver` (page 442)

Print phrasing slurs. Similar to Section 2.2.126 [`Slur_engraver`], page 447.

Music types accepted: `note-event` (page 54), and `phrasing-slur-event` (page 55),

This engraver creates the following layout object(s): `PhrasingSlur` (page 604).

`Pitched_trill_engraver` (page 443)

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 659), `TrillPitchGroup` (page 660), `TrillPitchHead` (page 661), and `TrillPitchParentheses` (page 662).

`Repeat_tie_engraver` (page 444)

Create repeat ties.

Music types accepted: `repeat-tie-event` (page 55),

This engraver creates the following layout object(s): `RepeatTie` (page 609), and `RepeatTieColumn` (page 610).

`Rest_engraver` (page 444)

Engrave rests.

Music types accepted: `rest-event` (page 55),

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): `Rest` (page 611).

`Rhythmic_column_engraver` (page 445)

Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 595).

`Script_column_engraver` (page 445)

Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 613).

`Script_engraver` (page 445)

Handle note scripted articulations.

Music types accepted: `articulation-event` (page 49),

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): `Script` (page 612).
- `Slash_repeat_engraver` (page 447)  
 Make beat repeats.  
 Music types accepted: `repeat-slash-event` (page 55),  
 This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 535), and `RepeatSlash` (page 608).
- `Slur_engraver` (page 447)  
 Build slur grobs from slur events.  
 Music types accepted: `note-event` (page 54), and `slur-event` (page 56),  
 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): `Slur` (page 621).
- `Spanner_break_forbid_engraver` (page 448)  
 Forbid breaks in certain spanners.
- `Text_engraver` (page 452)  
 Create text scripts.  
 Music types accepted: `text-script-event` (page 58),  
 This engraver creates the following layout object(s): `TextScript` (page 651).
- `Text_spanner_engraver` (page 453)  
 Create text spanner from an event.  
 Music types accepted: `text-span-event` (page 58),  
 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): `TextSpanner` (page 653).
- `Tie_engraver` (page 453)  
 Generate ties between note heads of equal pitch.  
 Music types accepted: `tie-event` (page 58),  
 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): Tie (page 654), and TieColumn (page 656).

Trill\_spanner\_engraver (page 455)

Create trill spanners.

Music types accepted: trill-span-event (page 59),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): TrillSpanner (page 662).

Tuplet\_engraver (page 456)

Catch tuplet events and generate appropriate bracket.

Music types accepted: tuplet-span-event (page 59),

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): TupletBracket (page 664), and TupletNumber (page 665).

### 2.1.17 InternalGregorianStaff

An internal Staff type with settings shared by multiple ancient notation schemes.

This context creates the following layout object(s): Accidental (page 475), AccidentalCautionary (page 476), AccidentalPlacement (page 477), AccidentalSuggestion (page 478), BarLine (page 486), BassFigure (page 491), BassFigureAlignment (page 492), BassFigureAlignmentPositioning (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), BassFigureLine (page 494), Clef (page 510), ClefModifier (page 513), CueClef (page 521), CueEndClef (page 524), Divisio (page 528), DotColumn (page 531), FingeringColumn (page 547), InstrumentName (page 559), KeyCancellation (page 563), KeySignature (page 566), LedgerLineSpanner (page 570), NoteCollision (page 594), OttavaBracket (page 598), PianoPedalBracket (page 605), RestCollision (page 612), ScriptColumn (page 613), ScriptRow (page 614), SostenuatoPedal (page 623), SostenuatoPedalLineSpanner (page 624), StaffEllipsis (page 628), StaffHighlight (page 631), StaffSpacing (page 632), StaffSymbol (page 632), SustainPedal (page 640), SustainPedalLineSpanner (page 641), TimeSignature (page 657), UnaCordaPedal (page 666), UnaCordaPedalLineSpanner (page 667), and VerticalAxisGroup (page 670).

This context sets the following properties:

- Set context property autoAccidentals to:  
'(Staff #<procedure 7f3394949b80 at ice-9/eval.scm:339:13 (a b c)>)
- Set context property autoCautionaries to '().

- Set context property `caesuraTypeTransform` to `caesura-to-bar-line-or-divisio`.
- Set context property `caesuraType` to:  
`'((breath . varcomma))`
- Set context property `createSpacing` to `#t`.
- Set context property `doubleRepeatBarType` to `"||"`.
- Set context property `doubleRepeatSegnoBarType` to `"S-||"`.
- Set context property `endRepeatBarType` to `"||"`.
- Set context property `endRepeatSegnoBarType` to `"S-||"`.
- Set context property `extraNatural` to `#f`.
- Set context property `fineBarType` to `"||"`.
- Set context property `fineSegnoBarType` to `"S-||"`.
- Set context property `fineStartRepeatSegnoBarType` to `"S-||"`.
- Set context property `forbidBreakBetweenBarLines` to `#f`.
- Set context property `ignoreFiguredBassRest` to `#f`.
- Set context property `instrumentName` to `'()`.
- Set context property `localAlterations` to `'()`.
- Set context property `measureBarType` to `'()`.
- Set context property `ottavationMarkups` to:  
`'((4 . "29")`  
`(3 . "22")`  
`(2 . "15")`  
`(1 . "8")`  
`(-1 . "8")`  
`(-2 . "15")`  
`(-3 . "22")`  
`(-4 . "29"))`
- Set context property `printKeyCancellation` to `#f`.
- Set context property `sectionBarType` to `"||"`.
- Set context property `segnoBarType` to `"S-||"`.
- Set context property `shortInstrumentName` to `'()`.
- Set context property `startRepeatBarType` to `"||"`.
- Set context property `startRepeatSegnoBarType` to `"S-||"`.
- Set context property `underlyingRepeatBarType` to `"||"`.
- Set grob property `extra-spacing-height` in `BreathingSign` (page 502), to `item::extra-spacing-height-including-staff`.
- Set grob property `extra-spacing-width` in `BreathingSign` (page 502), to:  
`'(-1.0 . 0.0)`

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

Context `InternalGregorianStaff` can contain `CueVoice` (page 98), and `NullVoice` (page 228).

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

`Accidental_engraver` (page 401)

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.

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 time-keeping, 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): Accidental (page 475), AccidentalCautionary (page 476), AccidentalPlacement (page 477), and AccidentalSuggestion (page 478).

Alteration\_glyph\_engraver (page 402)

Set the glyph-name-alist of all grobs having the accidental-switch-interface to the value of the context's alterationGlyphs property, when defined.

Properties (read)

alterationGlyphs (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., -1/2 for flat. This applies to all grobs that can print accidentals.

Axis\_group\_engraver (page 404)

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 items (clef, key signature, etc.).

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): VerticalAxisGroup (page 670).

Bar\_engraver (page 404)

Create bar lines for various commands, including \\bar.

If forbidBreakBetweenBarLines is true, allow line breaks at bar lines only.

Music types accepted: ad-hoc-jump-event (page 48), caesura-event (page 50), coda-mark-event (page 50), dal-segno-event (page 51), fine-event (page 51), section-event (page 56), segno-mark-event (page 56), and volta-span-event (page 59),

## Properties (read)

`caesuraType (list)`

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform (procedure)`

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType (string)`

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...'`.

`doubleRepeatSegnoBarType (string)`

Bar line to insert where an in-staff segno coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|.'`.

`endRepeatBarType (string)`

Bar line to insert at the end of a `\repeat volta`. The default is `':|..'`.

`endRepeatSegnoBarType (string)`

Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S'`.

`fineBarType (string)`

Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is  `'|.'`.

`fineSegnoBarType (string)`

Bar line to insert where an in-staff segno coincides with `\fine`. The default is  `'|.S'`.

`fineStartRepeatSegnoBarType (string)`

Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is  `'|.S.|.'`.

`forbidBreakBetweenBarLines` (boolean)  
 If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)  
 Bar line to insert at a measure boundary.

`repeatCommands` (list)  
 A list of commands related to volta-style repeats. In general, each element is a list, '*(command args...)*', but a command with no arguments may be abbreviated to a symbol; e.g., '*((start-repeat))*' may be given as '*(start-repeat)*'.

`end-repeat`  
 End a repeated section.

`start-repeat`  
 Start a repeated section.

`volta text`  
 If *text* is markup, start a volta bracket with that label; if *text* is #f, end a volta bracket.

`sectionBarType` (string)  
 Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '| |'.

`segnoBarType` (string)  
 Bar line to insert at an in-staff segno. The default is 'S'.

`segnoStyle` (symbol)  
 A symbol that indicates how to print a segno: bar-line or mark.

`startRepeatBarType` (string)  
 Bar line to insert at the start of a `\repeat volta`. The default is '.|:'.

`startRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is 'S.|:'.

`underlyingRepeatBarType` (string)  
 Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '| |'.

`whichBar` (string)  
 The current bar line type, or '()' if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

#### Properties (write)

`currentBarLine` (graphical (layout) object)  
 Set to the `BarLine` that `Bar_engraver` has created in the current timestep.



`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): `BarLine` (page 486).

`Clef_engraver` (page 413)

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.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to `#t` when an event forcing a line break was heard.

`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): `Clef` (page 510), and

`ClefModifier` (page 513).

`Collision_engraver` (page 414)

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): `NoteCollision` (page 594).

`Cue_clef_engraver` (page 416)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `ClefModifier` (page 513), `CueClef` (page 521), and `CueEndClef` (page 524).

`Divisio_engraver` (page 417)

Create divisiones: chant notation for points of breathing or caesura.

Music types accepted: `caesura-event` (page 50), `fine-event` (page 51), `section-event` (page 56), `volta-repeat-end-event` (page 59), and `volta-repeat-start-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at \caesura. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

- This engraver creates the following layout object(s): `Divisio` (page 528).
- `Dot_column_engraver` (page 418)  
 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): `DotColumn` (page 531).
- `Figured_bass_engraver` (page 421)  
 Make figured bass numbers.  
 Music types accepted: `bass-figure-event` (page 49), and `rest-event` (page 55),  
 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): `BassFigure` (page 491), `BassFigureAlignment` (page 492), `BassFigureBracket` (page 493), `BassFigureContinuation` (page 494), and `BassFigureLine` (page 494).
- `Figured_bass_position_engraver` (page 422)  
 Position figured bass alignments over notes.  
 This engraver creates the following layout object(s):  
`BassFigureAlignmentPositioning` (page 492).
- `Fingering_column_engraver` (page 422)  
 Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.  
 This engraver creates the following layout object(s): `FingeringColumn` (page 547).
- `Font_size_engraver` (page 423)  
 Put `fontSize` into `font-size` grob property.  
 Properties (read)
- `fontSize` (number)  
 The relative size of all grobs in a context.
- `Grob_pq_engraver` (page 426)  
 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.).

Instrument\_name\_engraver (page 427)

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 items (clef, key signature, etc.).

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): `InstrumentName` (page 559).

Key\_engraver (page 429)

Engrave a key signature.

Music types accepted: `key-change-event` (page 52),

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.

forbidBreak (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

forceBreak (boolean)

Set to `#t` when an event forcing a line break was heard.

keyAlterationOrder (list)

A list of pairs that defines in what order alterations should be printed. The format of an entry is (*step* . *alter*), where *step* is a number from 0 to 6 and *alter* from -1 (double flat) to 1 (double sharp), with exact rationals for alterations in between, e.g., 1/2 for sharp.

`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): `KeyCancellation` (page 563), and `KeySignature` (page 566).

`Ledger_line_engraver` (page 431)

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 570).

`Merge_mmrest_numbers_engraver` (page 435)

Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Non_musical_script_column_engraver` (page 438)

Find potentially colliding non-musical scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 613).

`Ottava_spanner_engraver` (page 439)

Create a text spanner when the ottavation property changes.

Music types accepted: `ottava-event` (page 54),

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): `OttavaBracket` (page 598).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Piano_pedal_align_engraver` (page 442)

Align piano pedal symbols and brackets.

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 624), `SustainPedalLineSpanner` (page 641), and `UnaCordaPedalLineSpanner` (page 667).

`Piano_pedal_engraver` (page 442)

Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 56), `sustain-event` (page 58), and `una-corda-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `PianoPedalBracket` (page 605), `SostenutoPedal` (page 623), `SustainPedal` (page 640), and `UnaCordaPedal` (page 666).

Pure\_from\_neighbor\_engraver (page 443)

Coordinates items that get their pure heights from their neighbors.

Rest\_collision\_engraver (page 444)

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): RestCollision (page 612).

Script\_row\_engraver (page 445)

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 614).

Separating\_line\_group\_engraver (page 446)

Generate objects for computing spacing parameters.

Properties (read)

createSpacing (boolean)

Create StaffSpacing objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)

True if currentCommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s): StaffSpacing (page 632).

Skip\_typesetting\_engraver (page 446)

Create a StaffEllipsis when skipTypesetting is used.

Properties (read)

skipTypesetting (boolean)

If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

This engraver creates the following layout object(s): StaffEllipsis (page 628).

Staff\_collecting\_engraver (page 448)

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\_highlight\_engraver (page 449)

Highlights music passages.

Music types accepted: staff-highlight-event (page 57),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

This engraver creates the following layout object(s): `StaffHighlight` (page 631).

`Staff_symbol_engraver` (page 449)

Create the constellation of five (default) staff lines.

Music types accepted: `staff-span-event` (page 57),

This engraver creates the following layout object(s): `StaffSymbol` (page 632).

`Time_signature_engraver` (page 454)

Create a Section 3.1.147 `[TimeSignature]`, page 657, whenever `timeSignatureFraction` changes.

Music types accepted: `time-signature-event` (page 58),

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): `TimeSignature` (page 657).

### 2.1.18 `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` (page 287).

This context creates the following layout object(s): `Accidental` (page 475), `AccidentalCautionary` (page 476), `AccidentalPlacement` (page 477), `AccidentalSuggestion` (page 478), `BarLine` (page 486), `BassFigure` (page 491), `BassFigureAlignment` (page 492), `BassFigureAlignmentPositioning` (page 492), `BassFigureBracket` (page 493), `BassFigureContinuation` (page 494), `BassFigureLine` (page 494), `BreathingSign` (page 502), `CaesuraScript` (page 505), `Clef` (page 510), `ClefModifier` (page 513), `CueClef` (page 521), `CueEndClef` (page 524), `DotColumn` (page 531), `FingeringColumn` (page 547), `InstrumentName` (page 559), `KeyCancellation` (page 563), `KeySignature` (page 566), `LedgerLineSpanner` (page 570), `NoteCollision` (page 594), `OttavaBracket` (page 598), `PianoPedalBracket` (page 605), `RestCollision` (page 612), `ScriptColumn` (page 613), `ScriptRow` (page 614), `SostenutoPedal` (page 623), `SostenutoPedalLineSpanner` (page 624), `StaffEllipsis` (page 628), `StaffHighlight` (page 631), `StaffSpacing` (page 632), `StaffSymbol` (page 632), `SustainPedal` (page 640), `SustainPedalLineSpanner` (page 641), `UnaCordaPedal` (page 666), `UnaCordaPedalLineSpanner` (page 667), and `VerticalAxisGroup` (page 670).

This context sets the following properties:

- Set context property `alterationGlyphs` to:  
'((-1/2 . "accidentals.kievanM1")  
(1/2 . "accidentals.kievan1"))'
- Set context property `autoAccidentals` to:  
'(Staff #<procedure 7f3394b658e0 at ice-9/eval.scm:339:13 (a b c)>)'
- Set context property `autoCautionaries` to '()'
- Set context property `caesuraType` to:  
'((bar-line . "."))'



- Set context property `clefGlyph` to `"clefs.kievan.do"`.
- Set context property `clefPosition` to 0.
- Set context property `clefTransposition` to 0.
- Set context property `createSpacing` to `#t`.
- Set context property `doubleRepeatBarType` to `"k"`.
- Set context property `endRepeatBarType` to `"k"`.
- Set context property `extraNatural` to `#f`.
- Set context property `fineBarType` to `"k"`.
- Set context property `forbidBreakBetweenBarLines` to `#f`.
- Set context property `ignoreFiguredBassRest` to `#f`.
- Set context property `instrumentName` to `'()`.
- Set context property `localAlterations` to `'()`.
- Set context property `measureBarType` to `'()`.
- Set context property `middleCClefPosition` to 0.
- Set context property `middleCPosition` to 0.
- Set context property `ottavationMarkups` to:  

```
'((4 . "29")
 (3 . "22")
 (2 . "15")
 (1 . "8")
 (-1 . "8")
 (-2 . "15")
 (-3 . "22")
 (-4 . "29"))
```
- Set context property `printKeyCancellation` to `#f`.
- Set context property `sectionBarType` to `"k"`.
- Set context property `shortInstrumentName` to `'()`.
- Set context property `startRepeatBarType` to `"k"`.
- Set context property `underlyingRepeatBarType` to `"k"`.
- Set grob property `thick-thickness` in `BarLine` (page 486), to 3.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type `KievanVoice` (page 189).

Context `KievanStaff` can contain `CueVoice` (page 98), `KievanVoice` (page 189), and `NullVoice` (page 228).

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

`Accidental_engraver` (page 401)

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.

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 time-keeping, 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) . (alterbarnumber . measureposition)) pairs.

This engraver creates the following layout object(s): Accidental (page 475), AccidentalCautionary (page 476), AccidentalPlacement (page 477), and AccidentalSuggestion (page 478).

## Alteration\_glyph\_engraver (page 402)

Set the glyph-name-alist of all grobs having the accidental-switch-interface to the value of the context's alterationGlyphs property, when defined.

## Properties (read)

## alterationGlyphs (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., -1/2 for flat. This applies to all grobs that can print accidentals.

## Axis\_group\_engraver (page 404)

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 items (clef, key signature, etc.).

## 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): VerticalAxisGroup (page 670).

## Bar\_engraver (page 404)

Create bar lines for various commands, including \\bar.

If forbidBreakBetweenBarLines is true, allow line breaks at bar lines only.

Music types accepted: ad-hoc-jump-event (page 48), caesura-event (page 50), coda-mark-event (page 50), dal-segno-event (page 51), fine-event (page 51), section-event (page 56), segno-mark-event (page 56), and volta-span-event (page 59),

## Properties (read)

## caesuraType (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...))
```

(underlying-bar-line . bar-type))

specifying which breath mark, bar line, and scripts to create at \caesura. All entries are optional.

bar-line has higher priority than a measure bar line and underlying-bar-line has lower priority than a measure bar line.

caesuraTypeTransform (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as caesuraType.

The first argument is the context.

The second argument is the value of caesuraType with an additional entry (articulations . *symbol-list*) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. bar-line indicates that the engraver has observed a BarLine at the current moment.

doubleRepeatBarType (string)

Bar line to insert where the end of one \repeat volta coincides with the start of another. The default is ':...:'.

doubleRepeatSegnoBarType (string)

Bar line to insert where an in-staff segno coincides with the end of one \repeat volta and the beginning of another. The default is ':|.S.|:'.

endRepeatBarType (string)

Bar line to insert at the end of a \repeat volta. The default is ':|.'.

endRepeatSegnoBarType (string)

Bar line to insert where an in-staff segno coincides with the end of a \repeat volta. The default is ':|.S'.

fineBarType (string)

Bar line to insert at \fine. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '|.'.

fineSegnoBarType (string)

Bar line to insert where an in-staff segno coincides with \fine. The default is '|.S'.

fineStartRepeatSegnoBarType (string)

Bar line to insert where an in-staff segno coincides with \fine and the start of a \repeat volta. The default is '|.S.|:'.

forbidBreakBetweenBarLines (boolean)

If set to true, Bar\_engraver forbids line breaks where there is no bar line.

measureBarType (string)

Bar line to insert at a measure boundary.

repeatCommands (list)

A list of commands related to volta-style repeats. In general, each element is a list, '(command args...)', but a command with no arguments

may be abbreviated to a symbol; e.g., '((start-repeat)) may be given as '(start-repeat).

end-repeat

End a repeated section.

start-repeat

Start a repeated section.

volta *text*

If *text* is markup, start a volta bracket with that label; if *text* is #f, end a volta bracket.

sectionBarType (string)

Bar line to insert at \section. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '| |'.

segnoBarType (string)

Bar line to insert at an in-staff segno. The default is 'S'.

segnoStyle (symbol)

A symbol that indicates how to print a segno: bar-line or mark.

startRepeatBarType (string)

Bar line to insert at the start of a \repeat volta. The default is '.|:'.

startRepeatSegnoBarType (string)

Bar line to insert where an in-staff segno coincides with the start of a \repeat volta. The default is 'S.|:'.

underlyingRepeatBarType (string)

Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '| |'.

whichBar (string)

The current bar line type, or '()' if there is no bar line. Setting this explicitly in user code is deprecated. Use \bar or related commands to set it.

Properties (write)

currentBarLine (graphical (layout) object)

Set to the BarLine that Bar\_engraver has created in the current timestep.

forbidBreak (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): BarLine (page 486).

Caesura\_engraver (page 411)

Notate a short break in sound that does not shorten the previous note.

Depending on the result of passing the value of caesuraType through caesuraTypeTransform, this engraver may create a BreathingSign with

CaesuraScript grobs aligned to it, or it may create CaesuraScript grobs and align them to a BarLine.

If this engraver observes a BarLine, it calls `caesuraTypeTransform` again with the new information, and if necessary, recreates its grobs.

Music types accepted: `caesura-event` (page 50),

Properties (read)

`breathMarkDefinitions` (list)

The description of breath marks. This is used by the `Breathing_sign_engraver`. See `scm/breath.scm` for more information.

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a BarLine at the current moment.

`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): `BreathingSign` (page 502), and `CaesuraScript` (page 505).

`Clef_engraver` (page 413)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `Clef` (page 510), and `ClefModifier` (page 513).

`Collision_engraver` (page 414)

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): `NoteCollision` (page 594).

`Cue_clef_engraver` (page 416)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `ClefModifier` (page 513), `CueClef` (page 521), and `CueEndClef` (page 524).

`Dot_column_engraver` (page 418)

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): `DotColumn` (page 531).

`Figured_bass_engraver` (page 421)

Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 49), and `rest-event` (page 55),

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): `BassFigure` (page 491), `BassFigureAlignment` (page 492), `BassFigureBracket` (page 493), `BassFigureContinuation` (page 494), and `BassFigureLine` (page 494).

`Figured_bass_position_engraver` (page 422)

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

`BassFigureAlignmentPositioning` (page 492).

`Fingering_column_engraver` (page 422)

Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 547).

`Font_size_engraver` (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.



**Grob\_pq\_engraver** (page 426)

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.).

**Instrument\_name\_engraver** (page 427)

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 items (clef, key signature, etc.).

`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): `InstrumentName` (page 559).

**Key\_engraver** (page 429)

Engrave a key signature.

Music types accepted: `key-change-event` (page 52),

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.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to `#t` when an event forcing a line break was heard.

`keyAlterationOrder` (list)

A list of pairs that defines in what order alterations should be printed.

The format of an entry is  $(step . alter)$ , where *step* is a number from 0 to 6 and *alter* from -1 (double flat) to 1 (double sharp), with exact rationals for alterations in between, e.g.,  $1/2$  for sharp.

`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): `KeyCancellation` (page 563), and `KeySignature` (page 566).

`Ledger_line_engraver` (page 431)

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 570).

`Merge_mmrest_numbers_engraver` (page 435)

Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Non_musical_script_column_engraver` (page 438)

Find potentially colliding non-musical scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 613).

Ottava\_spanner\_engraver (page 439)

Create a text spanner when the ottavation property changes.

Music types accepted: ottava-event (page 54),

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): OttavaBracket (page 598).

Output\_property\_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 49),

Piano\_pedal\_align\_engraver (page 442)

Align piano pedal symbols and brackets.

Properties (read)

currentCommandColumn (graphical (layout) object)

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

This engraver creates the following layout object(s): SostenutoPedalLineSpanner (page 624), SustainPedalLineSpanner (page 641), and UnaCordaPedalLineSpanner (page 667).

Piano\_pedal\_engraver (page 442)

Engrave piano pedal symbols and brackets.

Music types accepted: sostenuto-event (page 56), sustain-event (page 58), and una-corda-event (page 59),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): PianoPedalBracket (page 605), SostenuatoPedal (page 623), SustainPedal (page 640), and UnaCordaPedal (page 666).

Pure\_from\_neighbor\_engraver (page 443)

Coordinates items that get their pure heights from their neighbors.

Rest\_collision\_engraver (page 444)

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): RestCollision (page 612).

Script\_row\_engraver (page 445)

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 614).

Separating\_line\_group\_engraver (page 446)

Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

hasStaffSpacing (boolean)  
True if currentCommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s): StaffSpacing (page 632).

Skip\_typesetting\_engraver (page 446)

Create a StaffEllipsis when skipTypesetting is used.

Properties (read)

skipTypesetting (boolean)  
If true, no typesetting is done, speeding up the interpretation phase.  
Useful for debugging large scores.

This engraver creates the following layout object(s): StaffEllipsis (page 628).

Staff\_collecting\_engraver (page 448)

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\_highlight\_engraver (page 449)

Highlights music passages.

Music types accepted: staff-highlight-event (page 57),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

This engraver creates the following layout object(s): StaffHighlight (page 631).

Staff\_symbol\_engraver (page 449)

Create the constellation of five (default) staff lines.

Music types accepted: staff-span-event (page 57),

This engraver creates the following layout object(s): StaffSymbol (page 632).

### 2.1.19 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 (page 390).

This context creates the following layout object(s): Arpeggio (page 483), Beam (page 495), BendAfter (page 497), BreathingSign (page 502), ClusterSpanner (page 514), ClusterSpannerBeacon (page 515), CombineTextScript (page 517), Dots (page 531), DoublePercentRepeat (page 532), DoublePercentRepeatCounter (page 534), DoubleRepeatSlash (page 535), DynamicLineSpanner (page 538), DynamicText (page 539), DynamicTextSpanner (page 541), FingerGlideSpanner (page 544), Fingering (page 545), Flag (page 548), Glissando (page 552), Hairpin (page 555), InstrumentSwitch (page 560), KievanLigature (page 568), LaissezVibrerTie (page 569), LaissezVibrerTieColumn (page 570), MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), MultiMeasureRestText (page 591), NoteColumn (page 595), NoteHead (page 596), NoteSpacing (page 597), PercentRepeat (page 601), PercentRepeatCounter (page 602), PhrasingSlur (page 604), RepeatSlash (page 608), RepeatTie (page 609), RepeatTieColumn (page 610), Rest (page 611), Script (page 612), ScriptColumn (page 613), Slur (page 621), Stem (page 634), StemStub (page 636), StemTremolo (page 636), StringNumber (page 637), StrokeFinger (page 639), TextScript (page 651), TextSpanner (page 653), Tie (page 654), TieColumn (page 656), TrillPitchAccidental (page 659), TrillPitchGroup (page 660), TrillPitchHead (page 661), TrillPitchParentheses (page 662), TrillSpanner (page 662), TupletBracket (page 664), TupletNumber (page 665), and VoiceFollower (page 672).

This context sets the following properties:

- Set context property autoBeaming to #f.
- Set grob property duration-log in NoteHead (page 596), to note-head::calc-kievan-duration-log.
- Set grob property length in Stem (page 634), to 0.0.
- Set grob property positions in Beam (page 495), to beam::get-kievan-positions.
- Set grob property quantized-positions in Beam (page 495), to beam::get-kievan-quantized-positions.
- Set grob property stencil in Flag (page 548), to #f.
- Set grob property stencil in Slur (page 621), to #f.
- Set grob property stencil in Stem (page 634), to #f.
- Set grob property style in Dots (page 531), to 'kievan.

- Set grob property style in NoteHead (page 596), to 'kievan.
- Set grob property style in Rest (page 611), to 'mensural.
- Set grob property X-offset in Stem (page 634), to stem::kievan-offset-callback.

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):

Arpeggio\_engraver (page 403)

Generate an Arpeggio symbol.

Music types accepted: arpeggio-event (page 49),

This engraver creates the following layout object(s): Arpeggio (page 483).

Auto\_beam\_engraver (page 403)

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 2.2.141 [Stem\_engraver], page 450, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 49),

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): Beam (page 495).

Beam\_engraver (page 408)

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: beam-event (page 49),

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): Beam (page 495).

Bend\_engraver (page 410)

Create fall spanners.

Music types accepted: bend-after-event (page 49),

Properties (read)

currentBarLine (graphical (layout) object)

Set to the BarLine that Bar\_engraver has created in the current timestep.

currentCommandColumn (graphical (layout) object)

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

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): BendAfter (page 497).

Breathing\_sign\_engraver (page 411)

Notate breath marks.

Music types accepted: breathing-event (page 50),

Properties (read)

breathMarkType (symbol)

The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 502).

Chord\_tremolo\_engraver (page 413)

Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 59),

This engraver creates the following layout object(s): Beam (page 495).

Cluster\_spanner\_engraver (page 414)

Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 50),

This engraver creates the following layout object(s): ClusterSpanner (page 514), and ClusterSpannerBeacon (page 515).

Dots\_engraver (page 418)

Create Section 3.1.43 [Dots], page 531, objects for Section 3.2.118 [rhythmic-head-interface], page 736s.

This engraver creates the following layout object(s): Dots (page 531).

Double\_percent\_repeat\_engraver (page 418)

Make double measure repeats.

Music types accepted: double-percent-event (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 532), and `DoublePercentRepeatCounter` (page 534).

`Dynamic_align_engraver` (page 420)

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): `DynamicLineSpanner` (page 538).

`Dynamic_engraver` (page 420)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 48), `break-dynamic-span-event` (page 50), and `span-dynamic-event` (page 56),

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): `DynamicText` (page 539), `DynamicTextSpanner` (page 541), and `Hairpin` (page 555).

`Finger_glide_engraver` (page 422)

Engraver to print a line between two Fingering grobs.

Music types accepted: `note-event` (page 54),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 544).



Fingering\_engraver (page 423)

Create fingering scripts.

Music types accepted: `fingering-event` (page 51),

This engraver creates the following layout object(s): `Fingering` (page 545).

Font\_size\_engraver (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

Forbid\_line\_break\_engraver (page 423)

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, except if explicitly requested by the user.

Glissando\_engraver (page 424)

Engrave glissandi.

Music types accepted: `glissando-event` (page 52),

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): `Glissando` (page 552).

Grace\_auto\_beam\_engraver (page 425)

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: `beam-forbid-event` (page 49),

Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 495).

Grace\_beam\_engraver (page 425)

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: `beam-event` (page 49),

## 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): `Beam` (page 495).

`Grace_engraver` (page 425)

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.

`Grob_pq_engraver` (page 426)

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.).

`Instrument_switch_engraver` (page 428)

Create a cue text for taking instrument.

This engraver is deprecated.

## Properties (read)

`instrumentCueName` (markup)

The name to print if another instrument is to be taken.

This property is deprecated

This engraver creates the following layout object(s): `InstrumentSwitch` (page 560).

`Kievan_ligature_engraver` (page 431)

Handle `Kievan_ligature_events` by glueing Kievan heads together.

Music types accepted: `ligature-event` (page 52),

This engraver creates the following layout object(s): `KievanLigature` (page 568).

`Laissez_vibrer_engraver` (page 431)

Create `laissez vibrer` items.

Music types accepted: `laissez-vibrer-event` (page 52),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 569), and `LaissezVibrerTieColumn` (page 570).

`Multi_measure_rest_engraver` (page 437)

Engrave multi-measure rests that are produced with ‘R’. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.88 [`MultiMeasureRest`], page 587.

Music types accepted: `multi-measure-articulation-event` (page 53), `multi-measure-rest-event` (page 53), and `multi-measure-text-event` (page 53),  
Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`internalBarNumber` (integer)

Contains the current barnumber. This property is used for internal time-keeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)

True at the beginning of a measure.

`restNumberThreshold` (number)

If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), and `MultiMeasureRestText` (page 591).

`New_fingering_engraver` (page 437)

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): `Fingering` (page 545), `Script` (page 612), `StringNumber` (page 637), and `StrokeFinger` (page 639).

`Note_head_line_engraver` (page 438)

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): `VoiceFollower` (page 672).

Note\_heads\_engraver (page 438)

Generate note heads.

Music types accepted: note-event (page 54),

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): NoteHead (page 596).

Note\_spacing\_engraver (page 439)

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

This engraver creates the following layout object(s): NoteSpacing (page 597).

Output\_property\_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 49),

Part\_combine\_engraver (page 441)

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

Music types accepted: note-event (page 54), and part-combine-event (page 55),

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): CombineTextScript (page 517).

Percent\_repeat\_engraver (page 441)

Make whole measure repeats.

Music types accepted: percent-event (page 55),

Properties (read)

countPercentRepeats (boolean)

If set, produce counters for percent repeats.

currentCommandColumn (graphical (layout) object)

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

`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): `PercentRepeat` (page 601), and `PercentRepeatCounter` (page 602).

`Phrasing_slur_engraver` (page 442)

Print phrasing slurs. Similar to Section 2.2.126 [`Slur_engraver`], page 447.

Music types accepted: `note-event` (page 54), and `phrasing-slur-event` (page 55),

This engraver creates the following layout object(s): `PhrasingSlur` (page 604).

`Pitched_trill_engraver` (page 443)

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 659), `TrillPitchGroup` (page 660), `TrillPitchHead` (page 661), and `TrillPitchParentheses` (page 662).

`Repeat_tie_engraver` (page 444)

Create repeat ties.

Music types accepted: `repeat-tie-event` (page 55),

This engraver creates the following layout object(s): `RepeatTie` (page 609), and `RepeatTieColumn` (page 610).

`Rest_engraver` (page 444)

Engrave rests.

Music types accepted: `rest-event` (page 55),

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): `Rest` (page 611).

`Rhythmic_column_engraver` (page 445)

Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 595).

`Script_column_engraver` (page 445)

Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 613).

`Script_engraver` (page 445)

Handle note scripted articulations.

Music types accepted: `articulation-event` (page 49),

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): `Script` (page 612).
- `Slash_repeat_engraver` (page 447)  
 Make beat repeats.  
 Music types accepted: `repeat-slash-event` (page 55),  
 This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 535), and `RepeatSlash` (page 608).
- `Slur_engraver` (page 447)  
 Build slur grobs from slur events.  
 Music types accepted: `note-event` (page 54), and `slur-event` (page 56),  
 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): `Slur` (page 621).
- `Spanner_break_forbid_engraver` (page 448)  
 Forbid breaks in certain spanners.
- `Stem_engraver` (page 450)  
 Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.  
 Music types accepted: `tremolo-event` (page 58), and `tuplet-span-event` (page 59),  
 Properties (read)  
     `currentBarLine` (graphical (layout) object)  
         Set to the `BarLine` that `Bar_engraver` has created in the current timestep.  
     `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`.
- This engraver creates the following layout object(s): `Flag` (page 548), `Stem` (page 634), `StemStub` (page 636), and `StemTremolo` (page 636).
- `Text_engraver` (page 452)  
 Create text scripts.  
 Music types accepted: `text-script-event` (page 58),  
 This engraver creates the following layout object(s): `TextScript` (page 651).
- `Text_spanner_engraver` (page 453)  
 Create text spanner from an event.  
 Music types accepted: `text-span-event` (page 58),  
 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): TextSpanner (page 653).

Tie\_engraver (page 453)

Generate ties between note heads of equal pitch.

Music types accepted: tie-event (page 58),

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): Tie (page 654), and TieColumn (page 656).

Trill\_spanner\_engraver (page 455)

Create trill spanners.

Music types accepted: trill-span-event (page 59),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): TrillSpanner (page 662).

Tuplet\_engraver (page 456)

Catch tuplet events and generate appropriate bracket.

Music types accepted: tuplet-span-event (page 59),

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): TupletBracket (page 664), and TupletNumber (page 665).

### 2.1.20 Lyrics

Corresponds to a voice with lyrics. Handles the printing of a single line of lyrics.

This context creates the following layout object(s): InstrumentName (page 559), LyricExtender (page 574), LyricHyphen (page 575), LyricSpace (page 578), LyricText

(page 578), StanzaNumber (page 633), VerticalAxisGroup (page 670), and VowelTransition (page 675).

This context sets the following properties:

- Set context property `instrumentName` to `'()`.
- Set context property `lyricRepeatCountFormatter` to `#<procedure 7f33949758e0 at ice-9/eval.scm:336:13 (a b)>`.
- Set context property `searchForVoice` to `#f`.
- Set context property `shortInstrumentName` to `'()`.
- Set grob property `bar-extent` in `BarLine` (page 486), to :  
`'(-0.05 . 0.05)`
- Set grob property `font-size` in `InstrumentName` (page 559), to 1.0.
- Set grob property `nonstaff-nonstaff-spacing` in `VerticalAxisGroup` (page 670), to :  
`'((basic-distance . 0)  
  (minimum-distance . 2.8)  
  (padding . 0.2)  
  (stretchability . 0))`
- Set grob property `nonstaff-relatedstaff-spacing` in `VerticalAxisGroup` (page 670), to :  
`'((basic-distance . 5.5)  
  (padding . 0.5)  
  (stretchability . 1))`
- Set grob property `nonstaff-unrelatedstaff-spacing.padding` in `VerticalAxisGroup` (page 670), to 1.5.
- Set grob property `remove-empty` in `VerticalAxisGroup` (page 670), to `#t`.
- Set grob property `remove-first` in `VerticalAxisGroup` (page 670), to `#t`.
- Set grob property `self-alignment-Y` in `InstrumentName` (page 559), to `#f`.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 670), 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):

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Extender_engraver` (page 421)

Create lyric extenders.

Music types accepted: `completize-extender-event` (page 50), and `extender-event` (page 51),

Properties (read)

`extendersOverRests` (boolean)

Whether to continue extenders as they cross a rest.

This engraver creates the following layout object(s): `LyricExtender` (page 574).

`Font_size_engraver` (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

`Hyphen_engraver` (page 427)

Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted: `hyphen-event` (page 52), and `vowel-transition-event` (page 59),

This engraver creates the following layout object(s): `LyricHyphen` (page 575), `LyricSpace` (page 578), and `VowelTransition` (page 675).

`Instrument_name_engraver` (page 427)

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 items (clef, key signature, etc.).

`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): `InstrumentName` (page 559).

`Lyric_engraver` (page 431)

Engrave text for lyrics.

Music types accepted: `lyric-event` (page 53),

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): LyricText (page 578).

Pure\_from\_neighbor\_engraver (page 443)

Coordinates items that get their pure heights from their neighbors.

Stanza\_number\_engraver (page 450)

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): StanzaNumber (page 633).

### 2.1.21 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 (page 287).

This context creates the following layout object(s): Accidental (page 475), AccidentalCautionary (page 476), AccidentalPlacement (page 477), AccidentalSuggestion (page 478), BarLine (page 486), BassFigure (page 491), BassFigureAlignment (page 492), BassFigureAlignmentPositioning (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), BassFigureLine (page 494), BreathingSign (page 502), CaesuraScript (page 505), Clef (page 510), ClefModifier (page 513), CueClef (page 521), CueEndClef (page 524), Custos (page 527), DotColumn (page 531), FingeringColumn (page 547), InstrumentName (page 559), KeyCancellation (page 563), KeySignature (page 566), LedgerLineSpanner (page 570), NoteCollision (page 594), OttavaBracket (page 598), PianoPedalBracket (page 605), RestCollision (page 612), ScriptColumn (page 613), ScriptRow (page 614), SostenuitoPedal (page 623), SostenuitoPedalLineSpanner (page 624), StaffEllipsis (page 628), StaffHighlight (page 631), StaffSpacing (page 632), StaffSymbol (page 632), SustainPedal (page 640), SustainPedalLineSpanner (page 641), TimeSignature (page 657), UnaCordaPedal (page 666), UnaCordaPedalLineSpanner (page 667), and VerticalAxisGroup (page 670).

This context sets the following properties:

- Set context property alterationGlyphs to:  
'((-1/2 . "accidentals.mensuralM1")  
(0 . "accidentals.vaticana0")  
(1/2 . "accidentals.mensural1"))
- Set context property autoAccidentals to:  
'(Staff #<procedure 7f3394949b80 at ice-9/eval.scm:339:13 (a b c)>)
- Set context property autoCautionaries to '().
- Set context property caesuraTypeTransform to caesura-to-bar-line-or-divisio.
- Set context property caesuraType to:  
'((bar-line . "|"))

- Set context property `caesuraType` to:  
`'((breath . varcomma))`
- Set context property `clefGlyph` to `"clefs.mensural.g"`.
- Set context property `clefPosition` to `-2`.
- Set context property `clefTransposition` to `0`.
- Set context property `createSpacing` to `#t`.
- Set context property `doubleRepeatBarType` to `"||"`.
- Set context property `doubleRepeatSegnoBarType` to `"S-||"`.
- Set context property `endRepeatBarType` to `"||"`.
- Set context property `endRepeatSegnoBarType` to `"S-||"`.
- Set context property `extraNatural` to `#f`.
- Set context property `fineBarType` to `"||"`.
- Set context property `fineSegnoBarType` to `"S-||"`.
- Set context property `fineStartRepeatSegnoBarType` to `"S-||"`.
- Set context property `forbidBreakBetweenBarLines` to `#f`.
- Set context property `ignoreFiguredBassRest` to `#f`.
- Set context property `instrumentName` to `'()`.
- Set context property `localAlterations` to `'()`.
- Set context property `measureBarType` to `'()`.
- Set context property `middleCClefPosition` to `-6`.
- Set context property `middleCPosition` to `-6`.
- Set context property `ottavationMarkups` to:  
`'((4 . "29")`  
`(3 . "22")`  
`(2 . "15")`  
`(1 . "8")`  
`(-1 . "8")`  
`(-2 . "15")`  
`(-3 . "22")`  
`(-4 . "29"))`
- Set context property `printKeyCancellation` to `#f`.
- Set context property `sectionBarType` to `"||"`.
- Set context property `segnoBarType` to `"S-||"`.
- Set context property `shortInstrumentName` to `'()`.
- Set context property `startRepeatBarType` to `"||"`.
- Set context property `startRepeatSegnoBarType` to `"S-||"`.
- Set context property `underlyingRepeatBarType` to `"||"`.
- Set grob property `extra-spacing-height` in `BreathingSign` (page 502), to `item::extra-spacing-height-including-staff`.
- Set grob property `extra-spacing-width` in `BreathingSign` (page 502), to :  
`'(-1.0 . 0.0)`
- Set grob property `font-size` in `BreathingSign` (page 502), to `-2`.
- Set grob property `font-size` in `Divisio` (page 528), to `-2`.
- Set grob property `hair-thickness` in `BarLine` (page 486), to `0.6`.

- Set grob property neutral-direction in Custos (page 527), to -1.
- Set grob property neutral-position in Custos (page 527), to 3.
- Set grob property style in Custos (page 527), to 'mensural.
- Set grob property style in TimeSignature (page 657), to 'mensural.
- Set grob property thick-thickness in BarLine (page 486), to 1.8.
- Set grob property thickness in BreathingSign (page 502), to 1.
- Set grob property thickness in Divisio (page 528), to 1.
- Set grob property thickness in StaffSymbol (page 632), to 0.6.
- Unset context property caesuraTypeTransform

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type MensuralVoice (page 216).

Context MensuralStaff can contain CueVoice (page 98), MensuralVoice (page 216), and NullVoice (page 228).

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

Accidental\_engraver (page 401)

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.

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 time-keeping, 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): *Accidental* (page 475), *AccidentalCautionary* (page 476), *AccidentalPlacement* (page 477), and *AccidentalSuggestion* (page 478).

*Alteration\_glyph\_engraver* (page 402)

Set the *glyph-name-alist* of all grobs having the *accidental-switch-interface* to the value of the context's *alterationGlyphs* property, when defined.

Properties (read)

*alterationGlyphs* (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., -1/2 for flat. This applies to all grobs that can print accidentals.

*Axis\_group\_engraver* (page 404)

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 items (clef, key signature, etc.).

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): VerticalAxisGroup (page 670).

Bar\_engraver (page 404)

Create bar lines for various commands, including `\bar`.

If `forbidBreakBetweenBarLines` is true, allow line breaks at bar lines only.

Music types accepted: `ad-hoc-jump-event` (page 48), `caesura-event` (page 50), `coda-mark-event` (page 50), `dal-segno-event` (page 51), `fine-event` (page 51), `section-event` (page 56), `segno-mark-event` (page 56), and `volta-span-event` (page 59),

Properties (read)

caesuraType (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

caesuraTypeTransform (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

doubleRepeatBarType (string)

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...'`.

doubleRepeatSegnoBarType (string)

Bar line to insert where an in-staff `segno` coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|:.'`.

`endRepeatBarType` (string)  
 Bar line to insert at the end of a `\repeat volta`. The default is `':|..'`.

`endRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S'`.

`fineBarType` (string)  
 Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `|..'`.

`fineSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with `\fine`. The default is `|.S'`.

`fineStartRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `|.S.|:.'`.

`forbidBreakBetweenBarLines` (boolean)  
 If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)  
 Bar line to insert at a measure boundary.

`repeatCommands` (list)  
 A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`  
 End a repeated section.

`start-repeat`  
 Start a repeated section.

`volta text`  
 If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`sectionBarType` (string)  
 Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `||'`.

`segnoBarType` (string)  
 Bar line to insert at an in-staff segno. The default is `'S'`.

`segnoStyle` (symbol)  
 A symbol that indicates how to print a segno: bar-line or mark.

`startRepeatBarType` (string)  
 Bar line to insert at the start of a `\repeat volta`. The default is `'.|:.'`.

`startRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is `'S.|:.'`.

`underlyingRepeatBarType` (string)

Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '| |'.

`whichBar` (string)

The current bar line type, or '()' if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

Properties (write)

`currentBarLine` (graphical (layout) object)

Set to the BarLine that Bar\_engraver has created in the current timestep.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): BarLine (page 486).

Caesura\_engraver (page 411)

Notate a short break in sound that does not shorten the previous note.

Depending on the result of passing the value of `caesuraType` through `caesuraTypeTransform`, this engraver may create a BreathingSign with CaesuraScript grobs aligned to it, or it may create CaesuraScript grobs and align them to a BarLine.

If this engraver observes a BarLine, it calls `caesuraTypeTransform` again with the new information, and if necessary, recreates its grobs.

Music types accepted: `caesura-event` (page 50),

Properties (read)

`breathMarkDefinitions` (list)

The description of breath marks. This is used by the Breathing\_sign\_engraver. See `scm/breath.scm` for more information.

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.



The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`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): `BreathingSign` (page 502), and `CaesuraScript` (page 505).

`Clef_engraver` (page 413)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `Clef` (page 510), and `ClefModifier` (page 513).

`Collision_engraver` (page 414)

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): `NoteCollision` (page 594).

**Cue\_clef\_engraver** (page 416)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `ClefModifier` (page 513), `CueClef` (page 521), and `CueEndClef` (page 524).

**Custos\_engraver** (page 417)

Engrave custodes.

Properties (read)

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

This engraver creates the following layout object(s): `Custos` (page 527).

**Dot\_column\_engraver** (page 418)

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): `DotColumn` (page 531).

**Figured\_bass\_engraver** (page 421)

Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 49), and `rest-event` (page 55),

## 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): `BassFigure` (page 491), `BassFigureAlignment` (page 492), `BassFigureBracket` (page 493), `BassFigureContinuation` (page 494), and `BassFigureLine` (page 494).

`Figured_bass_position_engraver` (page 422)

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

`BassFigureAlignmentPositioning` (page 492).

`Fingering_column_engraver` (page 422)

Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 547).

`Font_size_engraver` (page 423)

Put `fontSize` into `font-size` grob property.

## Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

`Grob_pq_engraver` (page 426)

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.).

**Instrument\_name\_engraver** (page 427)

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 items (clef, key signature, etc.).

**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): **InstrumentName** (page 559).

**Key\_engraver** (page 429)

Engrave a key signature.

Music types accepted: **key-change-event** (page 52),

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.

**forbidBreak** (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

**forceBreak** (boolean)

Set to #t when an event forcing a line break was heard.

**keyAlterationOrder** (list)

A list of pairs that defines in what order alterations should be printed. The format of an entry is (*step* . *alter*), where *step* is a number from 0 to 6 and *alter* from -1 (double flat) to 1 (double sharp), with exact rationals for alterations in between, e.g., 1/2 for sharp.

**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): `KeyCancellation` (page 563), and `KeySignature` (page 566).

`Ledger_line_engraver` (page 431)

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 570).

`Merge_mmrest_numbers_engraver` (page 435)

Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Non_musical_script_column_engraver` (page 438)

Find potentially colliding non-musical scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 613).

`Ottava_spanner_engraver` (page 439)

Create a text spanner when the ottavation property changes.

Music types accepted: `ottava-event` (page 54),

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): `OttavaBracket` (page 598).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Piano_pedal_align_engraver` (page 442)

Align piano pedal symbols and brackets.

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 624), `SustainPedalLineSpanner` (page 641), and `UnaCordaPedalLineSpanner` (page 667).

`Piano_pedal_engraver` (page 442)

Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 56), `sustain-event` (page 58), and `una-corda-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `PianoPedalBracket` (page 605), `SostenutoPedal` (page 623), `SustainPedal` (page 640), and `UnaCordaPedal` (page 666).

`Pure_from_neighbor_engraver` (page 443)

Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 444)

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): RestCollision (page 612).

Script\_row\_engraver (page 445)

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 614).

Separating\_line\_group\_engraver (page 446)

Generate objects for computing spacing parameters.

Properties (read)

createSpacing (boolean)

Create StaffSpacing objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)

True if currentCommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s): StaffSpacing (page 632).

Skip\_typesetting\_engraver (page 446)

Create a StaffEllipsis when skipTypesetting is used.

Properties (read)

skipTypesetting (boolean)

If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

This engraver creates the following layout object(s): StaffEllipsis (page 628).

Staff\_collecting\_engraver (page 448)

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\_highlight\_engraver (page 449)

Highlights music passages.

Music types accepted: staff-highlight-event (page 57),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

This engraver creates the following layout object(s): StaffHighlight (page 631).

Staff\_symbol\_engraver (page 449)

Create the constellation of five (default) staff lines.

Music types accepted: staff-span-event (page 57),

This engraver creates the following layout object(s): StaffSymbol (page 632).

Time\_signature\_engraver (page 454)

Create a Section 3.1.147 [TimeSignature], page 657, whenever timeSignatureFraction changes.

Music types accepted: time-signature-event (page 58),

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): TimeSignature (page 657).

### 2.1.22 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 (page 390).

This context creates the following layout object(s): Arpeggio (page 483), Beam (page 495), BendAfter (page 497), BreathingSign (page 502), ClusterSpanner (page 514), ClusterSpannerBeacon (page 515), CombineTextScript (page 517), Dots (page 531), DoublePercentRepeat (page 532), DoublePercentRepeatCounter (page 534), DoubleRepeatSlash (page 535), DynamicLineSpanner (page 538), DynamicText (page 539), DynamicTextSpanner (page 541), FingerGlideSpanner (page 544), Fingering (page 545), Flag (page 548), Glissando (page 552), Hairpin (page 555), InstrumentSwitch (page 560), LaissezVibrerTie (page 569), LaissezVibrerTieColumn (page 570), MensuralLigature (page 584), MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), MultiMeasureRestText (page 591), NoteColumn (page 595), NoteHead (page 596), NoteSpacing (page 597), PercentRepeat (page 601), PercentRepeatCounter (page 602), PhrasingSlur (page 604), RepeatSlash (page 608), RepeatTie (page 609), RepeatTieColumn (page 610), Rest (page 611), Script (page 612), ScriptColumn (page 613), Stem (page 634), StemStub (page 636), StemTremolo (page 636), StringNumber (page 637), StrokeFinger (page 639), TextScript (page 651), TextSpanner (page 653), Tie (page 654), TieColumn (page 656), TrillPitchAccidental (page 659), TrillPitchGroup (page 660), TrillPitchHead (page 661), TrillPitchParentheses (page 662), TrillSpanner (page 662), TupletBracket (page 664), TupletNumber (page 665), and VoiceFollower (page 672).

This context sets the following properties:

- Set context property autoBeaming to #f.
- Set grob property style in Flag (page 548), to 'mensural.
- Set grob property style in NoteHead (page 596), to 'mensural.
- Set grob property style in Rest (page 611), to 'mensural.

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):

Arpeggio\_engraver (page 403)

Generate an Arpeggio symbol.

Music types accepted: arpeggio-event (page 49),

This engraver creates the following layout object(s): Arpeggio (page 483).

Auto\_beam\_engraver (page 403)

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 2.2.141 [Stem\_engraver], page 450, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 49),

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): Beam (page 495).

Beam\_engraver (page 408)

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: beam-event (page 49),

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): Beam (page 495).

Bend\_engraver (page 410)

Create fall spanners.

Music types accepted: bend-after-event (page 49),

Properties (read)

currentBarLine (graphical (layout) object)

Set to the BarLine that Bar\_engraver has created in the current timestep.

currentCommandColumn (graphical (layout) object)

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

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): BendAfter (page 497).

Breathing\_sign\_engraver (page 411)

Notate breath marks.

Music types accepted: breathing-event (page 50),

Properties (read)

breathMarkType (symbol)

The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 502).

Chord\_tremolo\_engraver (page 413)

Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 59),

This engraver creates the following layout object(s): Beam (page 495).

Cluster\_spanner\_engraver (page 414)

Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 50),

This engraver creates the following layout object(s): ClusterSpanner (page 514), and ClusterSpannerBeacon (page 515).

Dots\_engraver (page 418)

Create Section 3.1.43 [Dots], page 531, objects for Section 3.2.118 [rhythmic-head-interface], page 736s.

This engraver creates the following layout object(s): Dots (page 531).

Double\_percent\_repeat\_engraver (page 418)

Make double measure repeats.

Music types accepted: double-percent-event (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 532), and `DoublePercentRepeatCounter` (page 534).

`Dynamic_align_engraver` (page 420)

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): `DynamicLineSpanner` (page 538).

`Dynamic_engraver` (page 420)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 48), `break-dynamic-span-event` (page 50), and `span-dynamic-event` (page 56),

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): `DynamicText` (page 539), `DynamicTextSpanner` (page 541), and `Hairpin` (page 555).

`Finger_glide_engraver` (page 422)

Engraver to print a line between two Fingering grobs.

Music types accepted: `note-event` (page 54),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 544).

Fingering\_engraver (page 423)

Create fingering scripts.

Music types accepted: `fingering-event` (page 51),

This engraver creates the following layout object(s): `Fingering` (page 545).

Font\_size\_engraver (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

Forbid\_line\_break\_engraver (page 423)

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, except if explicitly requested by the user.

Glissando\_engraver (page 424)

Engrave glissandi.

Music types accepted: `glissando-event` (page 52),

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): `Glissando` (page 552).

Grace\_auto\_beam\_engraver (page 425)

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: `beam-forbid-event` (page 49),

Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 495).

Grace\_beam\_engraver (page 425)

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: `beam-event` (page 49),

## 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): `Beam` (page 495).

`Grace_engraver` (page 425)

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.

`Grob_pq_engraver` (page 426)

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.).

`Instrument_switch_engraver` (page 428)

Create a cue text for taking instrument.

This engraver is deprecated.

## Properties (read)

`instrumentCueName` (markup)

The name to print if another instrument is to be taken.

This property is deprecated

This engraver creates the following layout object(s): `InstrumentSwitch` (page 560).

`Laissez_vibrer_engraver` (page 431)

Create `laissez vibrer` items.

Music types accepted: `laissez-vibrer-event` (page 52),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 569), and `LaissezVibrerTieColumn` (page 570).

**Mensural\_ligature\_engraver** (page 435)

Handle `Mensural_ligature_events` by glueing special ligature heads together.

Music types accepted: `ligature-event` (page 52),

This engraver creates the following layout object(s): `MensuralLigature` (page 584).

**Multi\_measure\_rest\_engraver** (page 437)

Engrave multi-measure rests that are produced with ‘R’. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the Section 3.1.88 [`MultiMeasureRest`], page 587.

Music types accepted: `multi-measure-articulation-event` (page 53),

`multi-measure-rest-event` (page 53), and `multi-measure-text-event` (page 53),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`internalBarNumber` (integer)

Contains the current barnumber. This property is used for internal time-keeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)

True at the beginning of a measure.

`restNumberThreshold` (number)

If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), and `MultiMeasureRestText` (page 591).

**New\_fingering\_engraver** (page 437)

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): `Fingering` (page 545), `Script` (page 612), `StringNumber` (page 637), and `StrokeFinger` (page 639).

**Note\_head\_line\_engraver** (page 438)

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): `VoiceFollower` (page 672).
- `Note_heads_engraver` (page 438)  
 Generate note heads.  
 Music types accepted: `note-event` (page 54),  
 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): `NoteHead` (page 596).
- `Note_spacing_engraver` (page 439)  
 Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.  
 This engraver creates the following layout object(s): `NoteSpacing` (page 597).
- `Output_property_engraver` (page 439)  
 Apply a procedure to any grob acknowledged.  
 Music types accepted: `apply-output-event` (page 49),
- `Part_combine_engraver` (page 441)  
 Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.  
 Music types accepted: `note-event` (page 54), and `part-combine-event` (page 55),  
 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): `CombineTextScript` (page 517).
- `Percent_repeat_engraver` (page 441)  
 Make whole measure repeats.  
 Music types accepted: `percent-event` (page 55),  
 Properties (read)
- `countPercentRepeats` (boolean)  
 If set, produce counters for percent repeats.
  - `currentCommandColumn` (graphical (layout) object)  
 Grob that is X-parent to all current breakable items (clef, key signature, etc.).

`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): `PercentRepeat` (page 601), and `PercentRepeatCounter` (page 602).

`Phrasing_slur_engraver` (page 442)

Print phrasing slurs. Similar to Section 2.2.126 [`Slur_engraver`], page 447.

Music types accepted: `note-event` (page 54), and `phrasing-slur-event` (page 55),

This engraver creates the following layout object(s): `PhrasingSlur` (page 604).

`Pitched_trill_engraver` (page 443)

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 659), `TrillPitchGroup` (page 660), `TrillPitchHead` (page 661), and `TrillPitchParentheses` (page 662).

`Repeat_tie_engraver` (page 444)

Create repeat ties.

Music types accepted: `repeat-tie-event` (page 55),

This engraver creates the following layout object(s): `RepeatTie` (page 609), and `RepeatTieColumn` (page 610).

`Rest_engraver` (page 444)

Engrave rests.

Music types accepted: `rest-event` (page 55),

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): `Rest` (page 611).

`Rhythmic_column_engraver` (page 445)

Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 595).

`Script_column_engraver` (page 445)

Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 613).

`Script_engraver` (page 445)

Handle note scripted articulations.

Music types accepted: `articulation-event` (page 49),

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): `Script` (page 612).
- `Slash_repeat_engraver` (page 447)  
 Make beat repeats.  
 Music types accepted: `repeat-slash-event` (page 55),  
 This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 535), and `RepeatSlash` (page 608).
- `Spanner_break_forbid_engraver` (page 448)  
 Forbid breaks in certain spanners.
- `Stem_engraver` (page 450)  
 Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.  
 Music types accepted: `tremolo-event` (page 58), and `tuplet-span-event` (page 59),  
 Properties (read)  
     `currentBarLine` (graphical (layout) object)  
         Set to the `BarLine` that `Bar_engraver` has created in the current timestep.  
     `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`.  
 This engraver creates the following layout object(s): `Flag` (page 548), `Stem` (page 634), `StemStub` (page 636), and `StemTremolo` (page 636).
- `Text_engraver` (page 452)  
 Create text scripts.  
 Music types accepted: `text-script-event` (page 58),  
 This engraver creates the following layout object(s): `TextScript` (page 651).
- `Text_spanner_engraver` (page 453)  
 Create text spanner from an event.  
 Music types accepted: `text-span-event` (page 58),  
 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): `TextSpanner` (page 653).
- `Tie_engraver` (page 453)  
 Generate ties between note heads of equal pitch.  
 Music types accepted: `tie-event` (page 58),  
 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): `Tie` (page 654), and `TieColumn` (page 656).

`Trill_spanner_engraver` (page 455)

Create trill spanners.

Music types accepted: `trill-span-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `TrillSpanner` (page 662).

`Tuplet_engraver` (page 456)

Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 59),

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): `TupletBracket` (page 664), and `TupletNumber` (page 665).

### 2.1.23 NoteNames

A context for printing the names of notes.

This context also accepts commands for the following context(s): `Staff` (page 287).

This context creates the following layout object(s): `NoteName` (page 597), `StaffSpacing` (page 632), `Tie` (page 654), `TieColumn` (page 656), and `VerticalAxisGroup` (page 670).

This context sets the following properties:

- Set grob property `nonstaff-nonstaff-spacing` in `VerticalAxisGroup` (page 670), to :  

```
'((basic-distance . 0)
 (minimum-distance . 2.8)
 (padding . 0.2)
 (stretchability . 0))
```
- Set grob property `nonstaff-relatedstaff-spacing` in `VerticalAxisGroup` (page 670), to :  

```
'((basic-distance . 5.5)
```

```
(padding . 0.5)
(stretchability . 1))
```

- Set grob property `nonstaff-unrelatedstaff-spacing.padding` in `VerticalAxisGroup` (page 670), to 1.5.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 670), 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):

`Alteration_glyph_engraver` (page 402)

Set the `glyph-name-alist` of all grobs having the `accidental-switch-interface` to the value of the context’s `alterationGlyphs` property, when defined.

Properties (read)

`alterationGlyphs` (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., -1/2 for flat. This applies to all grobs that can print accidentals.

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Note_name_engraver` (page 438)

Print pitches as words.

Music types accepted: `note-event` (page 54),

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): `NoteName` (page 597).

`Separating_line_group_engraver` (page 446)

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)

Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)

True if `currentCommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 632).

`Tie_engraver` (page 453)

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 58),

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): `Tie` (page 654), and `TieColumn` (page 656).

### 2.1.24 NullVoice

For aligning lyrics without printing notes

This context also accepts commands for the following context(s): `Staff` (page 287), and `Voice` (page 390).

This context creates the following layout object(s): `Beam` (page 495), `NoteHead` (page 596), `Slur` (page 621), `Tie` (page 654), and `TieColumn` (page 656).

This context sets the following properties:

- Set context property `nullAccidentals` to `#t`.
- Set context property `squashedPosition` to 0.
- Set grob property `no-ledgers` in `NoteHead` (page 596), to `#t`.
- Set grob property `stencil` in `Beam` (page 495), to `#f`.
- Set grob property `stencil` in `NoteHead` (page 596), to `#f`.
- Set grob property `stencil` in `Slur` (page 621), to `#f`.
- Set grob property `stencil` in `Tie` (page 654), to `#f`.
- Set grob property `X-extent` in `NoteHead` (page 596), to `#<procedure 7f3394a8a640 at ice-9/eval.scm:333:13 (a)>`.

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):

Beam\_engraver (page 408)

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: beam-event (page 49),

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): Beam (page 495).

Grob\_pq\_engraver (page 426)

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.).

Note\_heads\_engraver (page 438)

Generate note heads.

Music types accepted: note-event (page 54),

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): NoteHead (page 596).

Pitch\_squash\_engraver (page 443)

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*.

`Slur_engraver` (page 447)

Build slur grobs from slur events.

Music types accepted: `note-event` (page 54), and `slur-event` (page 56),

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): `Slur` (page 621).

`Tie_engraver` (page 453)

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 58),

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): `Tie` (page 654), and `TieColumn` (page 656).

### 2.1.25 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): `VerticalAxisGroup` (page 670).

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type `Staff` (page 287).

Context `OneStaff` can contain `ChordNames` (page 95), `DrumStaff` (page 108), `Dynamics` (page 127), `FiguredBass` (page 132), `FretBoards` (page 133), `GregorianTranscriptionLyrics` (page 138), `GregorianTranscriptionStaff` (page 140), `KievanStaff` (page 176), `Lyrics` (page 199), `MensuralStaff` (page 202), `NoteNames` (page 226), `PetrucchiStaff` (page 231), `RhythmicStaff` (page 257), `Staff` (page 287), `TabStaff` (page 341), `VaticanaLyrics` (page 364), and `VaticanaStaff` (page 366).

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

Axis\_group\_engraver (page 404)

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 items (clef, key signature, etc.).

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): VerticalAxisGroup (page 670).

### 2.1.26 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 (page 287).

This context creates the following layout object(s): Accidental (page 475), AccidentalCautionary (page 476), AccidentalPlacement (page 477), AccidentalSuggestion (page 478), BarLine (page 486), BassFigure (page 491), BassFigureAlignment (page 492), BassFigureAlignmentPositioning (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), BassFigureLine (page 494), BreathingSign (page 502), CaesuraScript (page 505), Clef (page 510), ClefModifier (page 513), CueClef (page 521), CueEndClef (page 524), Custos (page 527), DotColumn (page 531), FingeringColumn (page 547), InstrumentName (page 559), KeyCancellation (page 563), KeySignature (page 566), LedgerLineSpanner (page 570), NoteCollision (page 594), OttavaBracket (page 598), PianoPedalBracket (page 605), RestCollision (page 612), ScriptColumn (page 613), ScriptRow (page 614), SignumRepetitionis (page 618), SostenuitoPedal (page 623), SostenuitoPedalLineSpanner (page 624), StaffEllipsis (page 628), StaffHighlight (page 631), StaffSpacing (page 632), StaffSymbol (page 632), SustainPedal (page 640), SustainPedalLineSpanner (page 641), TimeSignature (page 657), UnaCordaPedal (page 666), UnaCordaPedalLineSpanner (page 667), and VerticalAxisGroup (page 670).

This context sets the following properties:

- Set context property autoAccidentals to:  
'(Staff #<procedure 7f3394b48520 at ice-9/eval.scm:339:13 (a b c)>  
#<procedure neo-modern-accidental-rule (a b c)>)
- Set context property autoCautionaries to '().
- Set context property caesuraType to:  
'((bar-line . "|"))
- Set context property clefGlyph to "clefs.petrucci.g".
- Set context property clefPosition to -2.

- Set context property `clefTransposition` to 0.
- Set context property `createSpacing` to `#t`.
- Set context property `doubleRepeatBarType` to `'()`.
- Set context property `endRepeatBarType` to `'()`.
- Set context property `extraNatural` to `#f`.
- Set context property `fineBarType` to `"|."`.
- Set context property `forbidBreakBetweenBarLines` to `#f`.
- Set context property `ignoreFiguredBassRest` to `#f`.
- Set context property `instrumentName` to `'()`.
- Set context property `localAlterations` to `'()`.
- Set context property `measureBarType` to `'()`.
- Set context property `middleCClefPosition` to -6.
- Set context property `middleCPosition` to -6.
- Set context property `ottavationMarkups` to:
 

```
'((4 . "29")
 (3 . "22")
 (2 . "15")
 (1 . "8")
 (-1 . "8")
 (-2 . "15")
 (-3 . "22")
 (-4 . "29"))
```
- Set context property `printKeyCancellation` to `#f`.
- Set context property `sectionBarType` to `"||"`.
- Set context property `shortInstrumentName` to `'()`.
- Set context property `startRepeatBarType` to `"||"`.
- Set context property `underlyingRepeatBarType` to `'()`.
- Set grob property `bar-extent` in `BarLine` (page 486), to :
 

```
'(-2.5 . 2.5)
```
- Set grob property `bar-extent` in `SignumRepetitionis` (page 618), to :
 

```
'(-2.5 . 2.5)
```
- Set grob property `hair-thickness` in `BarLine` (page 486), to 2.21.
- Set grob property `hair-thickness` in `SignumRepetitionis` (page 618), to 2.21.
- Set grob property `kern` in `BarLine` (page 486), to 2.9.
- Set grob property `kern` in `SignumRepetitionis` (page 618), to 2.9.
- Set grob property `neutral-direction` in `Custos` (page 527), to -1.
- Set grob property `neutral-position` in `Custos` (page 527), to 3.
- Set grob property `rounded` in `BarLine` (page 486), to `#t`.
- Set grob property `rounded` in `SignumRepetitionis` (page 618), to `#t`.
- Set grob property `style` in `Custos` (page 527), to `'mensural`.
- Set grob property `thick-thickness` in `BarLine` (page 486), to 2.9.
- Set grob property `thick-thickness` in `SignumRepetitionis` (page 618), to 2.9.
- Set grob property `thickness` in `StaffSymbol` (page 632), to 1.3.



This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type `PetrucciVoice` (page 245).

Context `PetrucciStaff` can contain `CueVoice` (page 98), `NullVoice` (page 228), and `PetrucciVoice` (page 245).

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

`Accidental_engraver` (page 401)

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.

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 time-keeping, 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): `Accidental` (page 475), `AccidentalCautionary` (page 476), `AccidentalPlacement` (page 477), and `AccidentalSuggestion` (page 478).

`Alteration_glyph_engraver` (page 402)

Set the glyph-name-alist of all grobs having the accidental-switch-interface to the value of the context's `alterationGlyphs` property, when defined.

Properties (read)

`alterationGlyphs` (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., -1/2 for flat. This applies to all grobs that can print accidentals.

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

Bar\_engraver (page 404)

Create bar lines for various commands, including `\bar`.

If `forbidBreakBetweenBarLines` is true, allow line breaks at bar lines only.

Music types accepted: `ad-hoc-jump-event` (page 48), `caesura-event` (page 50), `coda-mark-event` (page 50), `dal-segno-event` (page 51), `fine-event` (page 51), `section-event` (page 56), `segno-mark-event` (page 56), and `volta-span-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...'`.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|.'`.

`endRepeatBarType` (string)

Bar line to insert at the end of a `\repeat volta`. The default is `':|..'`.

`endRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S.'`.

`fineBarType` (string)

Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is  `'|.'`.

`fineSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with `\fine`. The default is `'|.S'`.

`fineStartRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `'|.S.|:.'`.

`forbidBreakBetweenBarLines` (boolean)  
 If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)  
 Bar line to insert at a measure boundary.

`repeatCommands` (list)  
 A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`  
 End a repeated section.

`start-repeat`  
 Start a repeated section.

`volta text`  
 If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`sectionBarType` (string)  
 Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`segnoBarType` (string)  
 Bar line to insert at an in-staff segno. The default is `'S'`.

`segnoStyle` (symbol)  
 A symbol that indicates how to print a segno: `bar-line` or `mark`.

`startRepeatBarType` (string)  
 Bar line to insert at the start of a `\repeat volta`. The default is `'.|:.'`.

`startRepeatSegnoBarType` (string)  
 Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is `'S.|:.'`.

`underlyingRepeatBarType` (string)  
 Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`whichBar` (string)  
 The current bar line type, or `'()` if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

## Properties (write)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): `BarLine` (page 486).

`Caesura_engraver` (page 411)

Notate a short break in sound that does not shorten the previous note.

Depending on the result of passing the value of `caesuraType` through `caesuraTypeTransform`, this engraver may create a `BreathingSign` with `CaesuraScript` grobs aligned to it, or it may create `CaesuraScript` grobs and align them to a `BarLine`.

If this engraver observes a `BarLine`, it calls `caesuraTypeTransform` again with the new information, and if necessary, recreates its grobs.

Music types accepted: `caesura-event` (page 50),

## Properties (read)

`breathMarkDefinitions` (list)

The description of breath marks. This is used by the `Breathing_sign_engraver`. See `scm/breath.scm` for more information.

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`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): `BreathingSign` (page 502), and `CaesuraScript` (page 505).

`Clef_engraver` (page 413)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `Clef` (page 510), and `ClefModifier` (page 513).

`Collision_engraver` (page 414)

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): `NoteCollision` (page 594).

`Cue_clef_engraver` (page 416)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `ClefModifier` (page 513), `CueClef` (page 521), and `CueEndClef` (page 524).

`Custos_engraver` (page 417)

Engrave custodes.

Properties (read)

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

This engraver creates the following layout object(s): `Custos` (page 527).

`Dot_column_engraver` (page 418)

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): `DotColumn` (page 531).

`Figured_bass_engraver` (page 421)

Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 49), and `rest-event` (page 55),

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): `BassFigure` (page 491), `BassFigureAlignment` (page 492), `BassFigureBracket` (page 493), `BassFigureContinuation` (page 494), and `BassFigureLine` (page 494).

`Figured_bass_position_engraver` (page 422)

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

`BassFigureAlignmentPositioning` (page 492).

`Fingering_column_engraver` (page 422)

Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 547).

`Font_size_engraver` (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

`Grob_pq_engraver` (page 426)

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.).

`Instrument_name_engraver` (page 427)

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 items (clef, key signature, etc.).

`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): InstrumentName (page 559).

Key\_engraver (page 429)

Engrave a key signature.

Music types accepted: key-change-event (page 52),

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.

forbidBreak (boolean)  
If set to #t, prevent a line break at this point, except if explicitly requested by the user.

forceBreak (boolean)  
Set to #t when an event forcing a line break was heard.

keyAlterationOrder (list)  
A list of pairs that defines in what order alterations should be printed. The format of an entry is (*step* . *alter*), where *step* is a number from 0 to 6 and *alter* from -1 (double flat) to 1 (double sharp), with exact rationals for alterations in between, e.g., 1/2 for sharp.

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): `KeyCancellation` (page 563), and `KeySignature` (page 566).

`Ledger_line_engraver` (page 431)

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 570).

`Merge_mmrest_numbers_engraver` (page 435)

Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Non_musical_script_column_engraver` (page 438)

Find potentially colliding non-musical scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 613).

`Ottava_spanner_engraver` (page 439)

Create a text spanner when the ottavation property changes.

Music types accepted: `ottava-event` (page 54),

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): `OttavaBracket` (page 598).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Piano_pedal_align_engraver` (page 442)

Align piano pedal symbols and brackets.

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 624), `SustainPedalLineSpanner` (page 641), and `UnaCordaPedalLineSpanner` (page 667).

Piano\_pedal\_engraver (page 442)

Engrave piano pedal symbols and brackets.

Music types accepted: *sostenuto*-event (page 56), *sustain*-event (page 58), and *una-corda*-event (page 59),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): PianoPedalBracket (page 605), SostenutoPedal (page 623), SustainPedal (page 640), and UnaCordaPedal (page 666).

Pure\_from\_neighbor\_engraver (page 443)

Coordinates items that get their pure heights from their neighbors.

Rest\_collision\_engraver (page 444)

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): RestCollision (page 612).

Script\_row\_engraver (page 445)

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 614).

Separating\_line\_group\_engraver (page 446)

Generate objects for computing spacing parameters.

Properties (read)

createSpacing (boolean)

Create StaffSpacing objects? Should be set for staves.

- Properties (write)
- `hasStaffSpacing` (boolean)  
True if `currentCommandColumn` contains items that will affect spacing.
- This engraver creates the following layout object(s): `StaffSpacing` (page 632).
- `Signum_repetitionis_engraver` (page 446)
- Create a `SignumRepetitionis` at the end of a `\repeat volta` section.
  - Music types accepted: `volta-repeat-end-event` (page 59),
  - This engraver creates the following layout object(s): `SignumRepetitionis` (page 618).
- `Skip_typesetting_engraver` (page 446)
- Create a `StaffEllipsis` when `skipTypesetting` is used.
  - Properties (read)
    - `skipTypesetting` (boolean)  
If true, no typesetting is done, speeding up the interpretation phase.  
Useful for debugging large scores.  - This engraver creates the following layout object(s): `StaffEllipsis` (page 628).
- `Staff_collecting_engraver` (page 448)
- 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_highlight_engraver` (page 449)
- Highlights music passages.
  - Music types accepted: `staff-highlight-event` (page 57),
  - Properties (read)
    - `currentCommandColumn` (graphical (layout) object)  
Grob that is X-parent to all current breakable items (clef, key signature, etc.).  - This engraver creates the following layout object(s): `StaffHighlight` (page 631).
- `Staff_symbol_engraver` (page 449)
- Create the constellation of five (default) staff lines.
  - Music types accepted: `staff-span-event` (page 57),
  - This engraver creates the following layout object(s): `StaffSymbol` (page 632).
- `Time_signature_engraver` (page 454)
- Create a Section 3.1.147 [`TimeSignature`], page 657, whenever `timeSignatureFraction` changes.
  - Music types accepted: `time-signature-event` (page 58),
  - 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): `TimeSignature` (page 657).

### 2.1.27 PetrucciVoice

Same as `Voice` context, except that it is accommodated for typesetting a piece in Petrucci style.

This context also accepts commands for the following context(s): `Voice` (page 390).

This context creates the following layout object(s): `Arpeggio` (page 483), `Beam` (page 495), `BendAfter` (page 497), `BreathingSign` (page 502), `ClusterSpanner` (page 514), `ClusterSpannerBeacon` (page 515), `CombineTextScript` (page 517), `Dots` (page 531), `DoublePercentRepeat` (page 532), `DoublePercentRepeatCounter` (page 534), `DoubleRepeatSlash` (page 535), `DynamicLineSpanner` (page 538), `DynamicText` (page 539), `DynamicTextSpanner` (page 541), `FingerGlideSpanner` (page 544), `Fingering` (page 545), `Flag` (page 548), `Glissando` (page 552), `Hairpin` (page 555), `InstrumentSwitch` (page 560), `LaissezVibrerTie` (page 569), `LaissezVibrerTieColumn` (page 570), `MensuralLigature` (page 584), `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), `MultiMeasureRestText` (page 591), `NoteColumn` (page 595), `NoteHead` (page 596), `NoteSpacing` (page 597), `PercentRepeat` (page 601), `PercentRepeatCounter` (page 602), `PhrasingSlur` (page 604), `RepeatSlash` (page 608), `RepeatTie` (page 609), `RepeatTieColumn` (page 610), `Rest` (page 611), `Script` (page 612), `ScriptColumn` (page 613), `Slur` (page 621), `Stem` (page 634), `StemStub` (page 636), `StemTremolo` (page 636), `StringNumber` (page 637), `StrokeFinger` (page 639), `TextScript` (page 651), `TextSpanner` (page 653), `Tie` (page 654), `TieColumn` (page 656), `TrillPitchAccidental` (page 659), `TrillPitchGroup` (page 660), `TrillPitchHead` (page 661), `TrillPitchParentheses` (page 662), `TrillSpanner` (page 662), `TupletBracket` (page 664), `TupletNumber` (page 665), and `VoiceFollower` (page 672).

This context sets the following properties:

- Set context property `autoBeaming` to `#f`.
- Set grob property `length` in `Stem` (page 634), to 5.
- Set grob property `style` in `NoteHead` (page 596), to 'petrucci'.
- Set grob property `style` in `Rest` (page 611), to 'mensural'.
- Set grob property `thickness` in `Stem` (page 634), to 1.7.

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):

`Arpeggio_engraver` (page 403)

Generate an Arpeggio symbol.

Music types accepted: `arpeggio-event` (page 49),

This engraver creates the following layout object(s): `Arpeggio` (page 483).

`Auto_beam_engraver` (page 403)

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 2.2.141 [Stem\_engraver], page 450, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted: `beam-forbid-event` (page 49),

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): `Beam` (page 495).

`Beam_engraver` (page 408)

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 49),

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): `Beam` (page 495).

`Bend_engraver` (page 410)

Create fall spanners.

Music types accepted: `bend-after-event` (page 49),

Properties (read)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`currentCommandColumn` (graphical (layout) object)

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

`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): `BendAfter` (page 497).

`Breathing_sign_engraver` (page 411)

Notate breath marks.

Music types accepted: `breathing-event` (page 50),

Properties (read)

`breathMarkType` (symbol)

The type of `BreathingSign` to create at `\breathe`.

This engraver creates the following layout object(s): `BreathingSign` (page 502).

`Chord_tremolo_engraver` (page 413)

Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 59),

This engraver creates the following layout object(s): `Beam` (page 495).

`Cluster_spanner_engraver` (page 414)

Engrave a cluster using `Spanner` notation.

Music types accepted: `cluster-note-event` (page 50),

This engraver creates the following layout object(s): `ClusterSpanner` (page 514), and `ClusterSpannerBeacon` (page 515).

`Dots_engraver` (page 418)

Create Section 3.1.43 [Dots], page 531, objects for Section 3.2.118 [rhythmic-head-interface], page 736s.

This engraver creates the following layout object(s): `Dots` (page 531).

`Double_percent_repeat_engraver` (page 418)

Make double measure repeats.

Music types accepted: `double-percent-event` (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 532), and `DoublePercentRepeatCounter` (page 534).

`Dynamic_align_engraver` (page 420)

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): `DynamicLineSpanner` (page 538).

`Dynamic_engraver` (page 420)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 48), `break-dynamic-span-event` (page 50), and `span-dynamic-event` (page 56),

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): `DynamicText` (page 539), `DynamicTextSpanner` (page 541), and `Hairpin` (page 555).

`Finger_glide_engraver` (page 422)

Engraver to print a line between two Fingering grobs.

Music types accepted: `note-event` (page 54),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 544).

`Fingering_engraver` (page 423)

Create fingering scripts.

Music types accepted: `fingering-event` (page 51),

This engraver creates the following layout object(s): `Fingering` (page 545).

`Font_size_engraver` (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

`Forbid_line_break_engraver` (page 423)

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, except if explicitly requested by the user.

## Glissando\_engraver (page 424)

Engrave glissandi.

Music types accepted: *glissando-event* (page 52),

## Properties (read)

## glissandoMap (list)

A map in the form of '((source1 . target1) (source2 . target2) (source<sub>n</sub> . target<sub>n</sub>)) 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): *Glissando* (page 552).

## Grace\_auto\_beam\_engraver (page 425)

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: *beam-forbid-event* (page 49),

## Properties (read)

## autoBeaming (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s): *Beam* (page 495).

## Grace\_beam\_engraver (page 425)

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: *beam-event* (page 49),

## 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): *Beam* (page 495).

Grace\_engraver (page 425)

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.

Grob\_pq\_engraver (page 426)

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.).

Instrument\_switch\_engraver (page 428)

Create a cue text for taking instrument.

This engraver is deprecated.

Properties (read)

instrumentCueName (markup)

The name to print if another instrument is to be taken.

This property is deprecated

This engraver creates the following layout object(s): InstrumentSwitch (page 560).

Laissez\_vibrer\_engraver (page 431)

Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 52),

This engraver creates the following layout object(s): LaissezVibrerTie (page 569), and LaissezVibrerTieColumn (page 570).

Mensural\_ligature\_engraver (page 435)

Handle Mensural\_ligature\_events by glueing special ligature heads together.

Music types accepted: ligature-event (page 52),

This engraver creates the following layout object(s): MensuralLigature (page 584).

Multi\_measure\_rest\_engraver (page 437)

Engrave multi-measure rests that are produced with 'R'. It reads measureStartNow and internalBarNumber to determine what number to print over the Section 3.1.88 [MultiMeasureRest], page 587.

Music types accepted: multi-measure-articulation-event (page 53),

multi-measure-rest-event (page 53), and multi-measure-text-event (page 53),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

`internalBarNumber` (integer)

Contains the current barnumber. This property is used for internal time-keeping, among others by the `Accidental_engraver`.

`measureStartNow` (boolean)

True at the beginning of a measure.

`restNumberThreshold` (number)

If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), and `MultiMeasureRestText` (page 591).

`New_fingering_engraver` (page 437)

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): `Fingering` (page 545), `Script` (page 612), `StringNumber` (page 637), and `StrokeFinger` (page 639).

`Note_head_line_engraver` (page 438)

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): `VoiceFollower` (page 672).

`Note_heads_engraver` (page 438)

Generate note heads.

Music types accepted: `note-event` (page 54),

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): `NoteHead` (page 596).

`Note_spacing_engraver` (page 439)

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

This engraver creates the following layout object(s): `NoteSpacing` (page 597).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Part_combine_engraver` (page 441)

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

Music types accepted: `note-event` (page 54), and `part-combine-event` (page 55),

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): `CombineTextScript` (page 517).

`Percent_repeat_engraver` (page 441)

Make whole measure repeats.

Music types accepted: `percent-event` (page 55),

Properties (read)

`countPercentRepeats` (boolean)

If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)

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

`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): `PercentRepeat` (page 601), and `PercentRepeatCounter` (page 602).

`Phrasing_slur_engraver` (page 442)

Print phrasing slurs. Similar to Section 2.2.126 [`Slur_engraver`], page 447.

Music types accepted: `note-event` (page 54), and `phrasing-slur-event` (page 55),

This engraver creates the following layout object(s): `PhrasingSlur` (page 604).

`Pitched_trill_engraver` (page 443)

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 659), `TrillPitchGroup` (page 660), `TrillPitchHead` (page 661), and `TrillPitchParentheses` (page 662).

Repeat\_tie\_engraver (page 444)

Create repeat ties.

Music types accepted: repeat-tie-event (page 55),

This engraver creates the following layout object(s): RepeatTie (page 609), and RepeatTieColumn (page 610).

Rest\_engraver (page 444)

Engrave rests.

Music types accepted: rest-event (page 55),

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): Rest (page 611).

Rhythmic\_column\_engraver (page 445)

Generate NoteColumn, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): NoteColumn (page 595).

Script\_column\_engraver (page 445)

Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.

This engraver creates the following layout object(s): ScriptColumn (page 613).

Script\_engraver (page 445)

Handle note scripted articulations.

Music types accepted: articulation-event (page 49),

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): Script (page 612).

Slash\_repeat\_engraver (page 447)

Make beat repeats.

Music types accepted: repeat-slash-event (page 55),

This engraver creates the following layout object(s): DoubleRepeatSlash (page 535), and RepeatSlash (page 608).

Slur\_engraver (page 447)

Build slur grobs from slur events.

Music types accepted: note-event (page 54), and slur-event (page 56),

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): Slur (page 621).

`Spanner_break_forbid_engraver` (page 448)

Forbid breaks in certain spanners.

`Stem_engraver` (page 450)

Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 58), and `tuplet-span-event` (page 59),

Properties (read)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`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`.

This engraver creates the following layout object(s): `Flag` (page 548), `Stem` (page 634), `StemStub` (page 636), and `StemTremolo` (page 636).

`Text_engraver` (page 452)

Create text scripts.

Music types accepted: `text-script-event` (page 58),

This engraver creates the following layout object(s): `TextScript` (page 651).

`Text_spanner_engraver` (page 453)

Create text spanner from an event.

Music types accepted: `text-span-event` (page 58),

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): `TextSpanner` (page 653).

`Tie_engraver` (page 453)

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 58),

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): Tie (page 654), and TieColumn (page 656).

Trill\_spanner\_engraver (page 455)

Create trill spanners.

Music types accepted: trill-span-event (page 59),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): TrillSpanner (page 662).

Tuplet\_engraver (page 456)

Catch tuplet events and generate appropriate bracket.

Music types accepted: tuplet-span-event (page 59),

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): TupletBracket (page 664), and TupletNumber (page 665).

### 2.1.28 PianoStaff

Just like GrandStaff, but the staves are only removed together, never separately.

This context also accepts commands for the following context(s): GrandStaff (page 136).

This context creates the following layout object(s): Arpeggio (page 483), InstrumentName (page 559), SpanBar (page 626), SpanBarStub (page 627), StaffGrouper (page 630), SystemStartBar (page 644), SystemStartBrace (page 645), SystemStartBracket (page 645), SystemStartSquare (page 646), and VerticalAlignment (page 669).

This context sets the following properties:

- Set context property instrumentName to '()'.
- Set context property localAlterations to #f.
- Set context property localAlterations to '()'.
- Set context property localAlterations to '()'.
- Set context property shortInstrumentName to '()'.
- Set context property systemStartDelimiter to 'SystemStartBrace'.
- Set context property systemStartDelimiter to 'SystemStartBracket'.
- Set context property topLevelAlignment to #f.
- Set grob property extra-spacing-width in DynamicText (page 539), to #f.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Staff (page 287).

Context `PianoStaff` can contain `ChoirStaff` (page 66), `ChordNames` (page 95), `Devnull` (page 108), `DrumStaff` (page 108), `Dynamics` (page 127), `FiguredBass` (page 132), `FretBoards` (page 133), `GrandStaff` (page 136), `GregorianTranscriptionLyrics` (page 138), `GregorianTranscriptionStaff` (page 140), `KievanStaff` (page 176), `Lyrics` (page 199), `MensuralStaff` (page 202), `NoteNames` (page 226), `OneStaff` (page 230), `PetrucchiStaff` (page 231), `PianoStaff` (page 255), `RhythmicStaff` (page 257), `Staff` (page 287), `StaffGroup` (page 300), `TabStaff` (page 341), `VaticanaLyrics` (page 364), and `VaticanaStaff` (page 366).

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

`Instrument_name_engraver` (page 427)

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 items (clef, key signature, etc.).

`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): `InstrumentName` (page 559).

`Keep_alive_together_engraver` (page 429)

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.

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Span_arpeggio_engraver` (page 448)

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): `Arpeggio` (page 483).

`Span_bar_engraver` (page 448)

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): `SpanBar` (page 626).



`Span_bar_stub_engraver` (page 448)

Make stubs for span bars in all contexts that the span bars cross.

This engraver creates the following layout object(s): `SpanBarStub` (page 627).

`System_start_delimiter_engraver` (page 450)

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 items (clef, key signature, etc.).

`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): `SystemStartBar` (page 644), `SystemStartBrace` (page 645), `SystemStartBracket` (page 645), and `SystemStartSquare` (page 646).

`Vertical_align_engraver` (page 456)

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): `StaffGrouper` (page 630), and `VerticalAlignment` (page 669).

### 2.1.29 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` (page 287).

This context creates the following layout object(s): `BarLine` (page 486), `BreathingSign` (page 502), `CaesuraScript` (page 505), `DotColumn` (page 531), `InstrumentName` (page 559), `LedgerLineSpanner` (page 570), `StaffHighlight` (page 631), `StaffSpacing` (page 632), `StaffSymbol` (page 632), `TimeSignature` (page 657), and `VerticalAxisGroup` (page 670).

This context sets the following properties:

- Set context property `createSpacing` to `#t`.
- Set context property `instrumentName` to `'()`.
- Set context property `localAlterations` to `'()`.
- Set context property `shortInstrumentName` to `'()`.
- Set context property `squashedPosition` to 0.
- Set grob property `line-count` in `StaffSymbol` (page 632), to 1.

- Set grob property `neutral-direction` in `Beam` (page 495), to 1.
- Set grob property `neutral-direction` in `Stem` (page 634), to 1.
- Set grob property `staff-padding` in `VoltaBracket` (page 673), to 3.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type `Voice` (page 390).

Context `RhythmicStaff` can contain `CueVoice` (page 98), `NullVoice` (page 228), and `Voice` (page 390).

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

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Bar_engraver` (page 404)

Create bar lines for various commands, including `\\bar`.

If `forbidBreakBetweenBarLines` is true, allow line breaks at bar lines only.

Music types accepted: `ad-hoc-jump-event` (page 48), `caesura-event` (page 50), `coda-mark-event` (page 50), `dal-segno-event` (page 51), `fine-event` (page 51), `section-event` (page 56), `segno-mark-event` (page 56), and `volta-span-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

((`bar-line` . *bar-type*)

(`breath` . *breath-type*)

(`scripts` . *script-type...*)

(`underlying-bar-line` . *bar-type*))

specifying which breath mark, bar line, and scripts to create at `\\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (articulations . *symbol-list*) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...'`.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|.'`.

`endRepeatBarType` (string)

Bar line to insert at the end of a `\repeat volta`. The default is `':|.'`.

`endRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S'`.

`fineBarType` (string)

Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is  `'|.'`.

`fineSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with `\fine`. The default is  `'|.S'`.

`fineStartRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is  `'|.S.|.'`.

`forbidBreakBetweenBarLines` (boolean)

If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)

Bar line to insert at a measure boundary.

`repeatCommands` (list)

A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`

End a repeated section.

`start-repeat`

Start a repeated section.

`volta text`

If *text* is markup, start a volta bracket with that label; if *text* is #f, end a volta bracket.

`sectionBarType (string)`

Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '| |'.

`segnoBarType (string)`

Bar line to insert at an in-staff segno. The default is 'S'.

`segnoStyle (symbol)`

A symbol that indicates how to print a segno: bar-line or mark.

`startRepeatBarType (string)`

Bar line to insert at the start of a `\repeat volta`. The default is '.|:'.

`startRepeatSegnoBarType (string)`

Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is 'S.|:'.

`underlyingRepeatBarType (string)`

Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '| |'.

`whichBar (string)`

The current bar line type, or '()' if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

Properties (write)

`currentBarLine (graphical (layout) object)`

Set to the BarLine that Bar\_engraver has created in the current timestep.

`forbidBreak (boolean)`

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): BarLine (page 486).

Caesura\_engraver (page 411)

Notate a short break in sound that does not shorten the previous note.

Depending on the result of passing the value of `caesuraType` through `caesuraTypeTransform`, this engraver may create a BreathingSign with CaesuraScript grobs aligned to it, or it may create CaesuraScript grobs and align them to a BarLine.

If this engraver observes a BarLine, it calls `caesuraTypeTransform` again with the new information, and if necessary, recreates its grobs.

Music types accepted: caesura-event (page 50),

Properties (read)

`breathMarkDefinitions (list)`

The description of breath marks. This is used by the Breathing\_sign\_engraver. See `scm/breath.scm` for more information.

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`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): `BreathingSign` (page 502), and `CaesuraScript` (page 505).

`Dot_column_engraver` (page 418)

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): `DotColumn` (page 531).

`Font_size_engraver` (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

`Instrument_name_engraver` (page 427)

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 items (clef, key signature, etc.).

`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): `InstrumentName` (page 559).

`Ledger_line_engraver` (page 431)

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 570).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Pitch_squash_engraver` (page 443)

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*.

`Separating_line_group_engraver` (page 446)

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)

Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)

True if `currentCommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 632).

`Staff_highlight_engraver` (page 449)

Highlights music passages.

Music types accepted: `staff-highlight-event` (page 57),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `StaffHighlight` (page 631).

Staff\_symbol\_engraver (page 449)

Create the constellation of five (default) staff lines.

Music types accepted: staff-span-event (page 57),

This engraver creates the following layout object(s): StaffSymbol (page 632).

Time\_signature\_engraver (page 454)

Create a Section 3.1.147 [TimeSignature], page 657, whenever timeSignatureFraction changes.

Music types accepted: time-signature-event (page 58),

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): TimeSignature (page 657).

### 2.1.30 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.

An alias for Timing is established by the Timing\_translator in whatever context it is initialized, and the timing variables are then copied from wherever Timing had been previously established. The alias at Score level provides a target for initializing Timing variables in layout definitions before any Timing\_translator has been run.

This context also accepts commands for the following context(s): Timing (page 263).

This context creates the following layout object(s): BarNumber (page 489), BreakAlignGroup (page 500), BreakAlignment (page 501), CenteredBarNumber (page 506), CenteredBarNumberLineSpanner (page 507), CodaMark (page 515), ControlPoint (page 519), ControlPolygon (page 520), Footnote (page 549), GraceSpacing (page 553), JumpScript (page 561), LeftEdge (page 571), MetronomeMark (page 585), NonMusicalPaperColumn (page 593), PaperColumn (page 599), Parentheses (page 600), RehearsalMark (page 607), SectionLabel (page 614), SegnoMark (page 616), SpacingSpanner (page 625), StaffGrouper (page 630), SystemStartBar (page 644), SystemStartBrace (page 645), SystemStartBracket (page 645), SystemStartSquare (page 646), TextMark (page 649), VerticalAlignment (page 669), VoltaBracket (page 673), and VoltaBracketSpanner (page 674).

This context sets the following properties:

- Set context property additionalPitchPrefix to "".
- Set context property aDueText to "a2".
- Set context property alterationGlyphs to #f.
- Set context property alternativeRestores to:  
'(measurePosition

```

measureLength
measureStartNow
lastChord)

```

- Set context property associatedVoiceType to 'Voice.
- Set context property autoAccidentals to:  

```
'(Staff #<procedure 7f3394a0f920 at ice-9/eval.scm:339:13 (a b c)>)
```
- Set context property autoBeamCheck to default-auto-beam-check.
- Set context property autoBeaming to #t.
- Set context property autoCautionaries to '().
- Set context property barCheckSynchronize to #f.
- Set context property barNumberFormatter to robust-bar-number-function.
- Set context property barNumberVisibility to first-bar-number-invisible-and-no-parenthesized-bar-numbers.
- Set context property beamHalfMeasure to #t.
- Set context property breathMarkDefinitions to:  

```
'((altcomma
 (text #<procedure musicglyph-markup (a b c)>
 "scripts.raltcomma"))
 (caesura
 (text #<procedure musicglyph-markup (a b c)>
 "scripts.caesura.straight"))
 (chantdoublebar
 (extra-spacing-width -1.0 . 0.0)
 (stencil
 .
 #<procedure ly:breathing-sign::finalis (>)>
 (Y-offset . 0.0))
 (chantfullbar
 (extra-spacing-width -1.0 . 0.0)
 (stencil
 .
 #<procedure ly:breathing-sign::divisio-maxima (>)>
 (Y-offset . 0.0))
 (chanthalfbar
 (extra-spacing-height
 .
 #<procedure item::extra-spacing-height-including-staff (a)>
 (extra-spacing-width -1.0 . 0.0)
 (stencil
 .
 #<procedure ly:breathing-sign::divisio-maioir (>)>
 (Y-offset . 0.0))
 (chantquarterbar
 (extra-spacing-height
 .
 #<procedure item::extra-spacing-height-including-staff (a)>
 (extra-spacing-width -1.0 . 0.0)
 (stencil
 .
```



```

 #<procedure ly:breathing-sign::divisio-minima (_)>))
 (comma (text #<procedure musicglyph-markup (a b c)>
 "scripts.rcomma"))
 (curvedcaesura
 (text #<procedure musicglyph-markup (a b c)>
 "scripts.caesura.curved"))
 (outsidecomma
 (outside-staff-priority . 40)
 (text #<procedure musicglyph-markup (a b c)>
 "scripts.rcomma"))
 (spacer (text #<procedure null-markup (a b)>))
 (tickmark
 (outside-staff-priority . 40)
 (text #<procedure musicglyph-markup (a b c)>
 "scripts.tickmark"))
 (upbow (outside-staff-priority . 40)
 (text #<procedure musicglyph-markup (a b c)>
 "scripts.upbow"))
 (varcomma
 (text #<procedure musicglyph-markup (a b c)>
 "scripts.rvarcomma"))))

```

- Set context property breathMarkType to 'comma.
- Set context property caesuraType to:
- Set context property centerBarNumbers to #f.
- Set context property chordNameExceptions to:

```

'(((#<Pitch e' > #<Pitch gis' >)
 #<procedure line-markup (a b c)>
 ("+"))
 ((#<Pitch ees' > #<Pitch ges' >)
 #<procedure line-markup (a b c)>
 ((#<procedure line-markup (a b c)>
 ((#<procedure fontsize-markup (a b c d)> 2 "°")))))
 ((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >)
 #<procedure line-markup (a b c)>
 ((#<procedure super-markup (a b c)> "ø"))))
 ((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >)
 #<procedure concat-markup (a b c)>
 ((#<procedure line-markup (a b c)>
 ((#<procedure fontsize-markup (a b c d)> 2 "°"))
 (#<procedure super-markup (a b c)> "7"))))
 ((#<Pitch e' >
 #<Pitch g' >
 #<Pitch b' >
 #<Pitch fis'' >)
 #<procedure line-markup (a b c)>
 ((#<procedure super-markup (a b c)> "lyd"))))
 ((#<Pitch e' >
 #<Pitch g' >
 #<Pitch bes' >
 #<Pitch des'' >

```

```

#<Pitch ees'' >
#<Pitch fis'' >
#<Pitch aes'' >)
#<procedure line-markup (a b c)>
((#<procedure super-markup (a b c)> "alt"))
((#<Pitch g' >)
#<procedure line-markup (a b c)>
((#<procedure super-markup (a b c)> "5"))
((#<Pitch g' > #<Pitch c' >)
#<procedure line-markup (a b c)>
((#<procedure super-markup (a b c)> "5"))))

```

- Set context property chordNameFunction to ignatzek-chord-names.
- Set context property chordNameLowercaseMinor to #f.
- Set context property chordNameSeparator to:  
'(#<procedure hspace-markup (a b c)> 0.5)
- Set context property chordNoteNamer to '().
- Set context property chordPrefixSpacer to 0.
- Set context property chordRootNamer to note-name->markup.
- Set context property clefGlyph to "clefs.G".
- Set context property clefPosition to -2.
- Set context property clefTranspositionFormatter to clef-transposition-markup.
- Set context property codaMarkFormatter to #<procedure 7f3393da0ee0 at  
ice-9/eval.scm:336:13 (a b)>.
- Set context property completionFactor to unity-if-multimeasure.
- Set context property crescendoSpanner to 'hairpin.
- Set context property cueClefTranspositionFormatter to clef-transposition-markup.
- Set context property dalSegnoTextFormatter to format-dal-segno-text.
- Set context property decrescendoSpanner to 'hairpin.
- Set context property doubleRepeatBarType to ":...".
- Set context property doubleRepeatSegnoBarType to ":|.S.|".
- Set context property drumStyleTable to #<hash-table 7f3394b088c0 29/61>.
- Set context property endRepeatBarType to ":|".
- Set context property endRepeatSegnoBarType to ":|.S".
- Set context property explicitClefVisibility to:  
#(#t #t #t)
- Set context property explicitCueClefVisibility to:  
#(#f #t #t)
- Set context property explicitKeySignatureVisibility to:  
#(#t #t #t)
- Set context property extendersOverRests to #t.
- Set context property extraNatural to #t.
- Set context property figuredBassAlterationDirection to -1.
- Set context property figuredBassFormatter to format-bass-figure.
- Set context property figuredBassLargeNumberAlignment to 0.
- Set context property figuredBassPlusDirection to -1.

- Set context property figuredBassPlusStrokedAlist to:  

```
'((2 . "figbass.twoplus")
 (4 . "figbass.fourplus")
 (5 . "figbass.fiveplus")
 (6 . "figbass.sixstroked")
 (7 . "figbass.sevenstroked")
 (9 . "figbass.ninestroked"))
```
- Set context property fineBarType to "|. ".
- Set context property fineSegnoBarType to "|.S".
- Set context property fineStartRepeatSegnoBarType to "|.S.|: ".
- Set context property fineText to "Fine".
- Set context property fingeringOrientations to:  

```
'(up down)
```
- Set context property firstClef to #t.
- Set context property forbidBreakBetweenBarLines to #t.
- Set context property 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 context property harmonicAccidentals to #t.
- Set context property highStringOne to #t.
- Set context property initialTimeSignatureVisibility to:  

```
##(## #t #t)
```
- Set context property instrumentTransposition to #<Pitch c' >.
- Set context property keepAliveInterfaces to:  

```
'(bass-figure-interface
 chord-name-interface
 cluster-beacon-interface
 dynamic-interface
 fret-diagram-interface
 lyric-syllable-interface
 note-head-interface
 tab-note-head-interface
 lyric-interface
 percent-repeat-interface
```

stanza-number-interface)

- Set context 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 context property lyricMelismaAlignment to -1.
- Set context property majorSevenSymbol to:

```
'(#<procedure line-markup (a b c)>
 ((#<procedure fontsize-markup (a b c d)>
 -3
 (#<procedure triangle-markup (a b c)> #f))))
```

- Set context property measureBarType to "|".
- Set context property melismaBusyProperties to:

```
'(melismaBusy
 slurMelismaBusy
 tieMelismaBusy
 beamMelismaBusy
 completionBusy)
```

- Set context property metronomeMarkFormatter to format-metronome-markup.
  - Set context property middleCClefPosition to -6.
  - Set context property middleCPosition to -6.
  - Set context property minorChordModifier to:
- ```
'(#<procedure simple-markup (a b c)> "m")
```

- Set context property noChordSymbol to:
`'(<procedure simple-markup (a b c)> "N.C.")`
- Set context property noteNameFunction to note-name-markup.
- Set context property noteNameSeparator to "/".
- Set context property noteToFretFunction to determine-frets.
- Set context property partCombineTextsOnNote to #t.
- Set context property pedalSostenutoStrings to:
`'("Sost. Ped." "*Sost. Ped." "*")`
- Set context property pedalSostenutoStyle to 'mixed.
- Set context property pedalSustainStrings to:
`'("Ped." "*Ped." "*")`
- Set context property pedalSustainStyle to 'text.
- Set context property pedalUnaCordaStrings to:
`'("una corda" "" "tre corde")`
- Set context property pedalUnaCordaStyle to 'text.
- Set context property predefinedDiagramTable to #f.
- Set context property printAccidentalNames to #t.
- Set context property printKeyCancellation to #t.
- Set context property printOctaveNames to #f.
- Set context property printPartCombineTexts to #t.
- Set context property quotedCueEventTypes to:
`'(note-event
rest-event
tie-event
beam-event
tuplet-span-event
tremolo-event)`
- Set context property quotedEventTypes to:
`'(StreamEvent)`
- Set context property rehearsalMarkFormatter to #<procedure 7f3393db7140 at ice-9/eval.scm:336:13 (a b)>.
- Set context property rehearsalMark to 1.
- Set context property repeatCountVisibility to all-repeat-counts-visible.
- Set context property restNumberThreshold to 1.
- Set context property scriptDefinitions to:
`'((accent
 (avoid-slur . around)
 (padding . 0.2)
 (script-stencil feta "sforzato" . "sforzato")
 (side-relative-direction . -1))
(accentus
 (script-stencil feta "uaccentus" . "uaccentus")
 (side-relative-direction . -1)
 (avoid-slur . ignore)
 (padding . 0.2))`

```

    (quantize-position . #t)
    (script-priority . -100)
    (direction . 1))
(altcomma
  (script-stencil feta "laltcomma" . "raltcomma")
  (quantize-position . #t)
  (padding . 0.2)
  (avoid-slur . ignore)
  (direction . 1))
(circulus
  (script-stencil feta "circulus" . "circulus")
  (side-relative-direction . -1)
  (avoid-slur . ignore)
  (padding . 0.2)
  (quantize-position . #t)
  (script-priority . -100)
  (direction . 1))
(coda (script-stencil feta "coda" . "coda")
      (padding . 0.2)
      (avoid-slur . outside)
      (direction . 1))
(comma (script-stencil feta "lcomma" . "rcomma")
       (quantize-position . #t)
       (padding . 0.2)
       (avoid-slur . ignore)
       (direction . 1))
(downbow
  (script-stencil feta "downbow" . "downbow")
  (padding . 0.2)
  (skyline-horizontal-padding . 0.2)
  (avoid-slur . around)
  (direction . 1)
  (script-priority . 150))
(downmordent
  (script-stencil
    feta
    "downmordent"
    .
    "downmordent")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(downprall
  (script-stencil feta "downprall" . "downprall")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(espressivo
  (avoid-slur . around)
  (padding . 0.2)
  (script-stencil feta "espr" . "espr")
  (side-relative-direction . -1))

```

```

(fermata
  (script-stencil feta "dfermata" . "ufermata")
  (padding . 0.4)
  (avoid-slur . around)
  (script-priority . 4000)
  (direction . 1))
(flageolet
  (script-stencil feta "flageolet" . "flageolet")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(halfopen
  (avoid-slur . outside)
  (padding . 0.2)
  (script-stencil feta "halfopen" . "halfopen")
  (direction . 1))
(halfopenvertical
  (avoid-slur . outside)
  (padding . 0.2)
  (script-stencil
    feta
    "halfopenvertical"
    .
    "halfopenvertical")
  (direction . 1))
(haydnturn
  (script-stencil feta "haydnturn" . "haydnturn")
  (padding . 0.2)
  (avoid-slur . inside)
  (direction . 1))
(henzelongfermata
  (script-stencil
    feta
    "dhenzelongfermata"
    .
    "uhenzelongfermata")
  (padding . 0.4)
  (avoid-slur . around)
  (script-priority . 4000)
  (direction . 1))
(henzeshortfermata
  (script-stencil
    feta
    "dhenzeshortfermata"
    .
    "uhenzeshortfermata")
  (padding . 0.4)
  (avoid-slur . around)
  (script-priority . 4000)
  (direction . 1))
(ictus (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 . 0.4)
  (avoid-slur . around)
  (script-priority . 4000)
  (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))
(outsidecomma
  (avoid-slur . around)
  (direction . 1)
  (padding . 0.2)
  (script-stencil feta "lcomma" . "rcomma"))
(portato
  (script-stencil feta "uportato" . "dportato")
  (avoid-slur . around)
  (padding . 0.45)

```



```

    (side-relative-direction . -1))
(prall (script-stencil feta "prall" . "prall")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(pralldown
  (script-stencil feta "pralldown" . "pralldown")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(prallmordent
  (script-stencil
    feta
    "prallmordent"
    .
    "prallmordent")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(prallprall
  (script-stencil feta "prallprall" . "prallprall")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(prallup
  (script-stencil feta "prallup" . "prallup")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(reverseturn
  (script-stencil
    feta
    "reverseturn"
    .
    "reverseturn")
  (padding . 0.2)
  (avoid-slur . inside)
  (direction . 1))
(rheel (script-stencil feta "dpedalheel" . "dpedalheel")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(rtoe (script-stencil feta "dpedaltoe" . "dpedaltoe")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(segno (script-stencil feta "segno" . "segno")
  (padding . 0.2)
  (avoid-slur . outside)
  (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 . 0.4)
(avoid-slur . around)
(script-priority . 4000)
(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)
  (script-priority . -50)
  (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 . 0.4)
  (avoid-slur . around)
  (script-priority . 4000)
  (direction . 1))
(veryshortfermata
  (script-stencil
    feta
    "dveryshortfermata"
    .
    "uveryshortfermata")
  (padding . 0.4)
  (avoid-slur . around)
  (script-priority . 4000)
  (direction . 1)))

```

- Set context property sectionBarType to "||".
- Set context property segnoBarType to "S".
- Set context property segnoMarkFormatter to format-segno-mark-considering-bar-lines.
- Set context property segnoStyle to 'mark.
- Set context property slashChordSeparator to:
'(#<procedure simple-markup (a b c)> "/")
- Set context property soloIIText to "Solo II".
- Set context property soloText to "Solo".
- Set context property startRepeatBarType to ".|:".
- Set context property startRepeatSegnoBarType to "S.|:".
- Set context property stringNumberOrientations to:
'(up down)
- Set context property stringOneTopmost to #t.
- Set context property stringTunings to:
'(#<Pitch e' >
#<Pitch b >
#<Pitch g >
#<Pitch d >
#<Pitch a, >

```
#<Pitch e, >)
```

- Set context property `strokeFingerOrientations` to:
'(right)
- Set context property `subdivideBeams` to #f.
- Set context property `suspendMelodyDecisions` to #f.
- Set context property `systemStartDelimiter` to 'SystemStartBar.
- Set context property `tablatureFormat` to fret-number-tablature-format.
- Set context property `tabStaffLineLayoutFunction` to tablature-position-on-lines.
- Set context property `tieWaitForNote` to #f.
- Set context property `timeSignatureFraction` to:
'(4 . 4)
- Set context property `timeSignatureSettings` to:
'(((2 . 2) (beamExceptions (end (1/32 8 8 8 8))))
(3 . 2)
(beamExceptions (end (1/32 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)
(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))))
(9 . 4)
(beamExceptions (end (1/32 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))))
(5 . 8) (beatStructure 3 2))
(8 . 8) (beatStructure 3 3 2)))
- Set context property `timing` to #t.
- Set context property `topLevelAlignment` to #t.
- Set context property `underlyingRepeatBarType` to "||".

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type `Staff` (page 287).

Context `Score` can contain `ChoirStaff` (page 66), `ChordNames` (page 95), `Devnull` (page 108), `DrumStaff` (page 108), `Dynamics` (page 127), `FiguredBass` (page 132), `FretBoards` (page 133), `GrandStaff` (page 136), `GregorianTranscriptionLyrics` (page 138), `GregorianTranscriptionStaff` (page 140), `KievanStaff` (page 176), `Lyrics` (page 199), `MensuralStaff` (page 202), `NoteNames` (page 226), `OneStaff` (page 230), `PetrucchiStaff` (page 231), `PianoStaff` (page 255), `RhythmicStaff` (page 257), `Staff` (page 287), `StaffGroup` (page 300), `TabStaff` (page 341), `VaticanaLyrics` (page 364), and `VaticanaStaff` (page 366).

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

Bar_number_engraver (page 406)

A bar number may be created at any bar line, subject to the `barNumberVisibility` callback. By default, 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 2.2.135 [`Staff_collecting_engraver`], page 448. This engraver usually creates `BarNumber` grobs, but when `centerBarNumbers` is true, it makes `CenteredBarNumber` grobs instead.

Properties (read)

`alternativeNumber` (non-negative, exact integer)

When set, the index of the current \alternative element, starting from one. Not set outside of alternatives. Note the distinction from `volta number`: an alternative may pertain to multiple volte.

`alternativeNumberingStyle` (symbol)

The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to `numbers` to reset the bar number at each alternative, or set to `numbers-with-letters` to reset and also include letter suffixes.

`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.

`centerBarNumbers` (boolean)

Whether to center bar numbers in their measure instead of aligning them on the bar line.

`currentBarNumber` (integer)

Contains the current barnumber. This property is incremented at every bar line.

`currentCommandColumn` (graphical (layout) object)

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

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`measurePosition` (moment)

How much of the current measure have we had. This can be set manually to create incomplete measures.

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `BarNumber` (page 489), and `CenteredBarNumber` (page 506).

`Beam_collision_engraver` (page 408)

Help beams avoid colliding with notes and clefs in other voices.

`Break_align_engraver` (page 411)

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): `BreakAlignGroup` (page 500), `BreakAlignment` (page 501), and `LeftEdge` (page 571).

`Centered_bar_number_align_engraver` (page 412)

Group measure-centered bar numbers in a `CenteredBarNumberLineSpanner` so they end up on the same vertical position.

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s):

`CenteredBarNumberLineSpanner` (page 507).

`Concurrent_hairpin_engraver` (page 415)

Collect concurrent hairpins.

`Footnote_engraver` (page 423)

Create footnote texts.

This engraver creates the following layout object(s): `Footnote` (page 549).

`Grace_spacing_engraver` (page 426)

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): *GraceSpacing* (page 553).

Jump_engraver (page 428)

This engraver creates instructions such as *D.C.* and *Fine*, placing them vertically outside the set of staves given in the *stavesFound* context property.

If *Jump_engraver* is added or moved to another context, *Staff_collecting_engraver* (page 448), also needs to be there so that marks appear at the intended Y location.

Music types accepted: *ad-hoc-jump-event* (page 48), *dal-segno-event* (page 51), and *fine-event* (page 51),

Properties (read)

codaMarkCount (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

codaMarkFormatter (procedure)

A procedure that creates a coda mark (which in conventional *D.S. al Coda* form indicates the start of the alternative endings), taking as arguments the mark sequence number and the context. It should return a markup object.

dalSegnoTextFormatter (procedure)

Format a jump instruction such as *D.S.*

The first argument is the context.

The second argument is the number of times the instruction is performed.

The third argument is a list of three markups: *start-markup*, *end-markup*, and *next-markup*.

If *start-markup* is #f, the form is *da capo*; otherwise the form is *dal segno* and *start-markup* is the sign at the start of the repeated section.

If *end-markup* is not #f, it is either the sign at the end of the main body of the repeat, or it is a *Fine* instruction. When it is a *Fine* instruction, *next-markup* is #f.

If *next-markup* is not #f, it is the mark to be jumped to after performing the body of the repeat, e.g., *Coda*.

finalFineTextVisibility (boolean)

Whether \fine at the written end of the music should create a *Fine* instruction.

fineText (markup)

The text to print at \fine.

segnoMarkCount (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

segnoMarkFormatter (procedure)

A procedure that creates a segno (which conventionally indicates the start of a repeated section), taking as arguments the mark sequence number and the context. It should return a markup object.

stavesFound (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `JumpScript` (page 561).

`Mark_engraver` (page 432)

This engraver creates rehearsal marks, segno and coda marks, and section labels.

`Mark_engraver` creates marks, formats them, and places them vertically outside the set of staves given in the `stavesFound` context property.

If `Mark_engraver` is added or moved to another context, `Staff_collecting_engraver` (page 448), also needs to be there so that marks appear at the intended Y location.

By default, `Mark_engravers` in multiple contexts create a common sequence of marks chosen by the Score-level `Mark_tracking_translator` (page 433). If independent sequences are desired, multiple `Mark_tracking_translators` must be used.

Properties (read)

`codaMarkFormatter` (procedure)

A procedure that creates a coda mark (which in conventional *D.S. al Coda* form indicates the start of the alternative endings), taking as arguments the mark sequence number and the context. It should return a markup object.

`currentPerformanceMarkEvent` (stream event)

The coda, section, or segno mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`currentRehearsalMarkEvent` (stream event)

The ad-hoc or rehearsal mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`rehearsalMarkFormatter` (procedure)

A procedure taking as arguments the context and the sequence number of the rehearsal mark. It should return the formatted mark as a markup object.

`segnoMarkFormatter` (procedure)

A procedure that creates a segno (which conventionally indicates the start of a repeated section), taking as arguments the mark sequence number and the context. It should return a markup object.

stavesFound (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `CodaMark` (page 515),

`RehearsalMark` (page 607), `SectionLabel` (page 614), and `SegnoMark` (page 616).

`Mark_tracking_translator` (page 433)

This translator chooses which marks `Mark_engraver` should engrave.

Music types accepted: `ad-hoc-mark-event` (page 49), `coda-mark-event` (page 50), `rehearsal-mark-event` (page 55), `section-label-event` (page 56), and `segno-mark-event` (page 56),

Properties (read)

`codaMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

rehearsalMark (integer)

The next rehearsal mark to print.

segnoMarkCount (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

Properties (write)

codaMarkCount (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

currentPerformanceMarkEvent (stream event)

The coda, section, or segno mark event selected by Mark_tracking_translator for engraving by Mark_engraver.

currentRehearsalMarkEvent (stream event)

The ad-hoc or rehearsal mark event selected by Mark_tracking_translator for engraving by Mark_engraver.

rehearsalMark (integer)

The next rehearsal mark to print.

segnoMarkCount (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

Metronome_mark_engraver (page 436)

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 2.2.135 [Staff_collecting_engraver], page 448.

Music types accepted: tempo-change-event (page 58),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): MetronomeMark (page 585).

Output_property_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 49),

Paper_column_engraver (page 440)

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: break-event (page 50), and label-event (page 52),

Properties (read)

forbidBreak (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

Properties (write)

currentCommandColumn (graphical (layout) object)

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

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, except if explicitly requested by the user.

forceBreak (boolean)

Set to #t when an event forcing a line break was heard.

This engraver creates the following layout object(s): NonMusicalPaperColumn (page 593), and PaperColumn (page 599).

Parenthesis_engraver (page 441)

Parenthesize objects whose parenthesize property is #t.

This engraver creates the following layout object(s): Parentheses (page 600).

Repeat_acknowledge_engraver (page 444)

This translator adds entries to repeatCommands for events generated by \\repeat volta.

Music types accepted: volta-repeat-end-event (page 59), and volta-repeat-start-event (page 59),

Properties (write)

repeatCommands (list)

A list of commands related to volta-style repeats. In general, each element is a list, '(command args...), but a command with no arguments may be abbreviated to a symbol; e.g., '((start-repeat)) may be given as '(start-repeat).

end-repeat

End a repeated section.

start-repeat

Start a repeated section.

volta *text*

If *text* is markup, start a volta bracket with that label; if *text* is #f, end a volta bracket.

Show_control_points_engraver (page 446)

Create grobs to visualize control points of Bézier curves (ties and slurs) for ease of tweaking.

This engraver creates the following layout object(s): ControlPoint (page 519), and ControlPolygon (page 520).

Spacing_engraver (page 447)

Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.

Music types accepted: spacing-section-event (page 56),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): SpacingSpanner (page 625).

Spanner_tracking_engraver (page 448)

Helper for creating spanners attached to other spanners. If a spanner has the sticky-grob-interface, the engraver tracks the spanner contained in its sticky-host object. When the host ends, the sticky spanner attached to it has its end announced too.

Staff_collecting_engraver (page 448)

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.

Stanza_number_align_engraver (page 450)

This engraver ensures that stanza numbers are neatly aligned.

System_start_delimiter_engraver (page 450)

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 items (clef, key signature, etc.).

`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): `SystemStartBar` (page 644), `SystemStartBrace` (page 645), `SystemStartBracket` (page 645), and `SystemStartSquare` (page 646).

`Text_mark_engraver` (page 452)

Engraves arbitrary textual marks.

Music types accepted: `text-mark-event` (page 58),

Properties (read)

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `TextMark` (page 649).

`Timing_translator` (page 454)

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`.

Music types accepted: `alternative-event` (page 49), `bar-event` (page 49), and `fine-event` (page 51),

Properties (read)

`alternativeNumberingStyle` (symbol)

The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to `numbers` to reset the bar number at each alternative, or set to `numbers-with-letters` to reset and also include letter suffixes.

`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 incremented at every bar line.

`internalBarNumber` (integer)

Contains the current barnumber. This property is used for internal time-keeping, 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)

`alternativeNumber` (non-negative, exact integer)

When set, the index of the current \alternative element, starting from one. Not set outside of alternatives. Note the distinction from volta number: an alternative may pertain to multiple volte.

`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 incremented at every bar line.

`internalBarNumber` (integer)

Contains the current barnumber. This property is used for internal time-keeping, 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.

`measureStartNow` (boolean)

True at the beginning of a measure.

`timeSignatureFraction` (fraction, as pair)

A pair of numbers, signifying the time signature. For example, '(4 . 4)' is a 4/4 time signature.

`Tweak_engraver` (page 456)

Read the tweaks property from the originating event, and set properties.

`Vertical_align_engraver` (page 456)

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): `StaffGrouper` (page 630), and `VerticalAlignment` (page 669).

`Volta_engraver` (page 457)

Make volta brackets.

Music types accepted: `dal-segno-event` (page 51), `fine-event` (page 51), and `volta-span-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

repeatCommands (list)

A list of commands related to volta-style repeats. In general, each element is a list, '(*command args...*)', but a command with no arguments may be abbreviated to a symbol; e.g., '((start-repeat))' may be given as '(start-repeat).'

end-repeat

End a repeated section.

start-repeat

Start a repeated section.

volta *text*

If *text* is markup, start a volta bracket with that label; if *text* is #f, end a volta bracket.

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): VoltaBracket (page 673), and VoltaBracketSpanner (page 674).

2.1.31 Staff

Handles clefs, bar lines, keys, accidentals. It can contain Voice contexts.

This context creates the following layout object(s): Accidental (page 475), AccidentalCautionary (page 476), AccidentalPlacement (page 477), AccidentalSuggestion (page 478), BarLine (page 486), BassFigure (page 491), BassFigureAlignment (page 492), BassFigureAlignmentPositioning (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), BassFigureLine (page 494), BreathingSign (page 502), CaesuraScript (page 505), Clef (page 510), ClefModifier (page 513), CueClef (page 521), CueEndClef (page 524), DotColumn (page 531), FingeringColumn (page 547), InstrumentName (page 559), KeyCancellation (page 563), KeySignature (page 566), LedgerLineSpanner (page 570), NoteCollision (page 594), OttavaBracket (page 598), PianoPedalBracket (page 605), RestCollision (page 612), ScriptColumn (page 613), ScriptRow (page 614), SostenuotoPedal (page 623), SostenuotoPedalLineSpanner (page 624), StaffEllipsis (page 628), StaffHighlight (page 631), StaffSpacing (page 632), StaffSymbol (page 632), SustainPedal (page 640), SustainPedalLineSpanner (page 641), TimeSignature (page 657), UnaCordaPedal (page 666), UnaCordaPedalLineSpanner (page 667), and VerticalAxisGroup (page 670).

This context sets the following properties:

- Set context property createSpacing to #t.
- Set context property ignoreFiguredBassRest to #f.
- Set context property instrumentName to '().
- Set context property localAlterations to '().
- Set context property ottavationMarkups to:


```
'((4 . "29")
  (3 . "22")
  (2 . "15"))
```

```
(1 . "8")
(-1 . "8")
(-2 . "15")
(-3 . "22")
(-4 . "29"))
```

- Set context property `shortInstrumentName` to `'()`.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type `Voice` (page 390).

Context `Staff` can contain `CueVoice` (page 98), `NullVoice` (page 228), and `Voice` (page 390).

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

`Accidental_engraver` (page 401)

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.

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 time-keeping, 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): `Accidental` (page 475), `AccidentalCautionary` (page 476), `AccidentalPlacement` (page 477), and `AccidentalSuggestion` (page 478).

`Alteration_glyph_engraver` (page 402)

Set the glyph-name-alist of all grobs having the accidental-switch-interface to the value of the context's `alterationGlyphs` property, when defined.

Properties (read)

`alterationGlyphs` (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., -1/2 for flat. This applies to all grobs that can print accidentals.

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Bar_engraver` (page 404)

Create bar lines for various commands, including `\\bar`.

If `forbidBreakBetweenBarLines` is true, allow line breaks at bar lines only.

Music types accepted: `ad-hoc-jump-event` (page 48), `caesura-event` (page 50), `coda-mark-event` (page 50), `dal-segno-event` (page 51), `fine-event` (page 51), `section-event` (page 56), `segno-mark-event` (page 56), and `volta-span-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

`((bar-line . bar-type)`

`(breath . breath-type)`

`(scripts . script-type...)`

`(underlying-bar-line . bar-type))`

specifying which breath mark, bar line, and scripts to create at `\\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one `\\repeat volta` coincides with the start of another. The default is `':...'`.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one `\\repeat volta` and the beginning of another. The default is `':|.S.|.'`.

`endRepeatBarType` (string)

Bar line to insert at the end of a `\\repeat volta`. The default is `':|..'`.

`endRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of a `\\repeat volta`. The default is `':|.S.'`.

`fineBarType` (string)
 Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'|. '`.

`fineSegnoBarType` (string)
 Bar line to insert where an in-staff segno coincides with `\fine`. The default is `'|.S'`.

`fineStartRepeatSegnoBarType` (string)
 Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `'|.S.|: '`.

`forbidBreakBetweenBarLines` (boolean)
 If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)
 Bar line to insert at a measure boundary.

`repeatCommands` (list)
 A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`
 End a repeated section.

`start-repeat`
 Start a repeated section.

`volta text`
 If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`sectionBarType` (string)
 Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`segnoBarType` (string)
 Bar line to insert at an in-staff segno. The default is `'S'`.

`segnoStyle` (symbol)
 A symbol that indicates how to print a segno: `bar-line` or `mark`.

`startRepeatBarType` (string)
 Bar line to insert at the start of a `\repeat volta`. The default is `'.|: '`.

`startRepeatSegnoBarType` (string)
 Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is `'S.|: '`.

`underlyingRepeatBarType` (string)
 Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`whichBar` (string)

The current bar line type, or '()' if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

Properties (write)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): `BarLine` (page 486).

`Caesura_engraver` (page 411)

Notate a short break in sound that does not shorten the previous note.

Depending on the result of passing the value of `caesuraType` through `caesuraTypeTransform`, this engraver may create a `BreathingSign` with `CaesuraScript` grobs aligned to it, or it may create `CaesuraScript` grobs and align them to a `BarLine`.

If this engraver observes a `BarLine`, it calls `caesuraTypeTransform` again with the new information, and if necessary, recreates its grobs.

Music types accepted: `caesura-event` (page 50),

Properties (read)

`breathMarkDefinitions` (list)

The description of breath marks. This is used by the `Breathing_sign_engraver`. See `scm/breath.scm` for more information.

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`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): `BreathingSign` (page 502), and `CaesuraScript` (page 505).

`Clef_engraver` (page 413)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `Clef` (page 510), and `ClefModifier` (page 513).

`Collision_engraver` (page 414)

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): `NoteCollision` (page 594).

`Cue_clef_engraver` (page 416)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `ClefModifier` (page 513), `CueClef` (page 521), and `CueEndClef` (page 524).

`Dot_column_engraver` (page 418)

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): `DotColumn` (page 531).

`Figured_bass_engraver` (page 421)

Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 49), and `rest-event` (page 55),

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): BassFigure (page 491), BassFigureAlignment (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), and BassFigureLine (page 494).

Figured_bass_position_engraver (page 422)

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

BassFigureAlignmentPositioning (page 492).

Fingering_column_engraver (page 422)

Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.

This engraver creates the following layout object(s): FingeringColumn (page 547).

Font_size_engraver (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

Grob_pq_engraver (page 426)

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.).

Instrument_name_engraver (page 427)

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 items (clef, key signature, etc.).

`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): `InstrumentName` (page 559).

`Key_engraver` (page 429)

Engrave a key signature.

Music types accepted: `key-change-event` (page 52),

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.
- `forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.
- `forceBreak` (boolean)
Set to `#t` when an event forcing a line break was heard.
- `keyAlterationOrder` (list)
A list of pairs that defines in what order alterations should be printed. The format of an entry is `(step . alter)`, where `step` is a number from 0 to 6 and `alter` from -1 (double flat) to 1 (double sharp), with exact rationals for alterations in between, e.g., `1/2` for sharp.
- `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))`.
- `lastKeyAlt` (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): `KeyCancellation` (page 563), and `KeySignature` (page 566).

`Ledger_line_engraver` (page 431)

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 570).

`Merge_mmrest_numbers_engraver` (page 435)

Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Non_musical_script_column_engraver` (page 438)

Find potentially colliding non-musical scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 613).

`Ottava_spanner_engraver` (page 439)

Create a text spanner when the ottavation property changes.

Music types accepted: `ottava-event` (page 54),

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): `OttavaBracket` (page 598).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Piano_pedal_align_engraver` (page 442)

Align piano pedal symbols and brackets.

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 624), `SustainPedalLineSpanner` (page 641), and `UnaCordaPedalLineSpanner` (page 667).

`Piano_pedal_engraver` (page 442)

Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 56), `sustain-event` (page 58), and `una-corda-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `PianoPedalBracket` (page 605), `SostenutoPedal` (page 623), `SustainPedal` (page 640), and `UnaCordaPedal` (page 666).

`Pure_from_neighbor_engraver` (page 443)

Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 444)

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): `RestCollision` (page 612).

`Script_row_engraver` (page 445)

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 614).

`Separating_line_group_engraver` (page 446)

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)

Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)

True if `currentCommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 632).

`Skip_typesetting_engraver` (page 446)

Create a `StaffEllipsis` when `skipTypesetting` is used.

Properties (read)

`skipTypesetting` (boolean)

If true, no typesetting is done, speeding up the interpretation phase.
Useful for debugging large scores.

This engraver creates the following layout object(s): `StaffEllipsis` (page 628).

`Staff_collecting_engraver` (page 448)

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_highlight_engraver` (page 449)

Highlights music passages.

Music types accepted: `staff-highlight-event` (page 57),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `StaffHighlight` (page 631).

`Staff_symbol_engraver` (page 449)

Create the constellation of five (default) staff lines.

Music types accepted: `staff-span-event` (page 57),

This engraver creates the following layout object(s): `StaffSymbol` (page 632).

`Time_signature_engraver` (page 454)

Create a Section 3.1.147 [TimeSignature], page 657, whenever `timeSignatureFraction` changes.

Music types accepted: `time-signature-event` (page 58),

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): `TimeSignature` (page 657).

2.1.32 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): Arpeggio (page 483), InstrumentName (page 559), SpanBar (page 626), SpanBarStub (page 627), StaffGrouper (page 630), SystemStartBar (page 644), SystemStartBrace (page 645), SystemStartBracket (page 645), SystemStartSquare (page 646), and VerticalAlignment (page 669).

This context sets the following properties:

- Set context property `instrumentName` to `'()`.
- Set context property `localAlterations` to `#f`.
- Set context property `localAlterations` to `'()`.
- Set context property `shortInstrumentName` to `'()`.
- Set context property `systemStartDelimiter` to `'SystemStartBracket`.
- Set context property `topLevelAlignment` to `#f`.
- Set grob property `extra-spacing-width` in `DynamicText` (page 539), to `#f`.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type `Staff` (page 287).

Context `StaffGroup` can contain `ChoirStaff` (page 66), `ChordNames` (page 95), `Devnull` (page 108), `DrumStaff` (page 108), `Dynamics` (page 127), `FiguredBass` (page 132), `FretBoards` (page 133), `GrandStaff` (page 136), `GregorianTranscriptionLyrics` (page 138), `GregorianTranscriptionStaff` (page 140), `KievanStaff` (page 176), `Lyrics` (page 199), `MensuralStaff` (page 202), `NoteNames` (page 226), `OneStaff` (page 230), `PetrucchiStaff` (page 231), `PianoStaff` (page 255), `RhythmicStaff` (page 257), `Staff` (page 287), `StaffGroup` (page 300), `TabStaff` (page 341), `VaticanaLyrics` (page 364), and `VaticanaStaff` (page 366).

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

`Instrument_name_engraver` (page 427)

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 items (clef, key signature, etc.).

`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): `InstrumentName` (page 559).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Span_arpeggio_engraver` (page 448)

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): `Arpeggio` (page 483).

`Span_bar_engraver` (page 448)

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): `SpanBar` (page 626).

`Span_bar_stub_engraver` (page 448)

Make stubs for span bars in all contexts that the span bars cross.

This engraver creates the following layout object(s): `SpanBarStub` (page 627).

`System_start_delimiter_engraver` (page 450)

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 items (clef, key signature, etc.).

`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): `SystemStartBar` (page 644), `SystemStartBrace` (page 645), `SystemStartBracket` (page 645), and `SystemStartSquare` (page 646).

`Vertical_align_engraver` (page 456)

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): `StaffGrouper` (page 630), and `VerticalAlignment` (page 669).

2.1.33 StandaloneRhythmScore

A Score-level context for use by `\markup \rhythm`.

This context also accepts commands for the following context(s): `Score` (page 263), and `Timing` (page 263).

This context creates the following layout object(s): `BarNumber` (page 489), `BreakAlignGroup` (page 500), `BreakAlignment` (page 501), `CenteredBarNumber` (page 506), `CenteredBarNumberLineSpanner` (page 507), `CodaMark` (page 515), `ControlPoint` (page 519), `ControlPolygon` (page 520), `Footnote` (page 549), `GraceSpacing` (page 553), `JumpScript` (page 561), `LeftEdge` (page 571), `MetronomeMark` (page 585), `NonMusicalPaperColumn` (page 593), `PaperColumn` (page 599), `Parentheses` (page 600), `RehearsalMark` (page 607), `SectionLabel` (page 614), `SegnoMark` (page 616), `SpacingSpanner` (page 625), `StaffGroup` (page 630), `SystemStartBar` (page 644), `SystemStartBrace` (page 645), `SystemStartBracket` (page 645), `SystemStartSquare` (page 646), `TextMark` (page 649), `VerticalAlignment` (page 669), `VoltaBracket` (page 673), and `VoltaBracketSpanner` (page 674).

This context sets the following properties:

- Set context property `additionalPitchPrefix` to `""`.
- Set context property `aDueText` to `"a2"`.
- Set context property `alterationGlyphs` to `#f`.
- Set context property `alternativeRestores` to:


```
'(measurePosition
  measureLength
  measureStartNow
  lastChord)
```
- Set context property `associatedVoiceType` to `'Voice`.
- Set context property `autoAccidentals` to:


```
'(Staff #<procedure 7f3394a0f920 at ice-9/eval.scm:339:13 (a b c)>)
```
- Set context property `autoBeamCheck` to `default-auto-beam-check`.
- Set context property `autoBeaming` to `#t`.
- Set context property `autoCautionaries` to `'()`.
- Set context property `barCheckSynchronize` to `#f`.
- Set context property `barNumberFormatter` to `robust-bar-number-function`.
- Set context property `barNumberVisibility` to `first-bar-number-invisible-and-no-parenthesized-bar-numbers`.
- Set context property `beamHalfMeasure` to `#t`.
- Set context property `breathMarkDefinitions` to:


```
'((altcomma
  (text #<procedure musicglyph-markup (a b c)>
    "scripts.raltcomma"))
  (caesura
  (text #<procedure musicglyph-markup (a b c)>
    "scripts.caesura.straight"))
  (chantdoublebar
  (extra-spacing-width -1.0 . 0.0)
  (stencil
  .
  #<procedure ly:breathing-sign::finalis (>)>
  (Y-offset . 0.0))
```

```

(chantfullbar
  (extra-spacing-width -1.0 . 0.0)
  (stencil
    .
    #<procedure ly:breathing-sign::divisio-maxima (_)>
    (Y-offset . 0.0))
(chanthalfbar
  (extra-spacing-height
    .
    #<procedure item::extra-spacing-height-including-staff (a)>
    (extra-spacing-width -1.0 . 0.0)
    (stencil
      .
      #<procedure ly:breathing-sign::divisio-maior (_)>
      (Y-offset . 0.0))
(chantquarterbar
  (extra-spacing-height
    .
    #<procedure item::extra-spacing-height-including-staff (a)>
    (extra-spacing-width -1.0 . 0.0)
    (stencil
      .
      #<procedure ly:breathing-sign::divisio-minima (_)>)))
(comma (text #<procedure musicglyph-markup (a b c)>
  "scripts.rcomma"))
(curvedcaesura
  (text #<procedure musicglyph-markup (a b c)>
    "scripts.caesura.curved"))
(outsidecomma
  (outside-staff-priority . 40)
  (text #<procedure musicglyph-markup (a b c)>
    "scripts.rcomma"))
(spacer (text #<procedure null-markup (a b c)>))
(tickmark
  (outside-staff-priority . 40)
  (text #<procedure musicglyph-markup (a b c)>
    "scripts.tickmark"))
(upbow (outside-staff-priority . 40)
  (text #<procedure musicglyph-markup (a b c)>
    "scripts.upbow"))
(varcomma
  (text #<procedure musicglyph-markup (a b c)>
    "scripts.rvarcomma"))))

```

- Set context property breathMarkType to 'comma.
- Set context property caesuraType to:
'((breath . caesura))
- Set context property centerBarNumbers to #f.
- Set context property chordNameExceptions to:
'(((#<Pitch e' > #<Pitch gis' >)
#<procedure line-markup (a b c)>
("+"))

```

((#<Pitch ees' > #<Pitch ges' >)
 #<procedure line-markup (a b c)>
 ((#<procedure line-markup (a b c)>
  ((#<procedure fontsize-markup (a b c d)> 2 "°")))))
((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >)
 #<procedure line-markup (a b c)>
 ((#<procedure super-markup (a b c)> "ø"))))
((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >)
 #<procedure concat-markup (a b c)>
 ((#<procedure line-markup (a b c)>
  ((#<procedure fontsize-markup (a b c d)> 2 "°"))
  (#<procedure super-markup (a b c)> "7"))))
((#<Pitch e' >
  #<Pitch g' >
  #<Pitch b' >
  #<Pitch fis'' >)
 #<procedure line-markup (a b c)>
 ((#<procedure super-markup (a b c)> "lyd"))))
((#<Pitch e' >
  #<Pitch g' >
  #<Pitch bes' >
  #<Pitch des'' >
  #<Pitch ees'' >
  #<Pitch fis'' >
  #<Pitch aes'' >)
 #<procedure line-markup (a b c)>
 ((#<procedure super-markup (a b c)> "alt"))))
((#<Pitch g' >)
 #<procedure line-markup (a b c)>
 ((#<procedure super-markup (a b c)> "5"))))
((#<Pitch g' > #<Pitch c'' >)
 #<procedure line-markup (a b c)>
 ((#<procedure super-markup (a b c)> "5"))))

```

- Set context property chordNameFunction to ignatzek-chord-names.
- Set context property chordNameLowercaseMinor to #f.
- Set context property chordNameSeparator to:
'(#<procedure hspace-markup (a b c)> 0.5)
- Set context property chordNoteNamer to '().
- Set context property chordPrefixSpacer to 0.
- Set context property chordRootNamer to note-name->markup.
- Set context property clefGlyph to "clefs.G".
- Set context property clefPosition to -2.
- Set context property clefTranspositionFormatter to clef-transposition-markup.
- Set context property codaMarkFormatter to #<procedure 7f3393da0ee0 at ice-9/eval.scm:336:13 (a b)>.
- Set context property completionFactor to unity-if-multimeasure.
- Set context property crescendoSpanner to 'hairpin.
- Set context property cueClefTranspositionFormatter to clef-transposition-markup.
- Set context property dalSegnoTextFormatter to format-dal-segno-text.

- Set context property `decrescendoSpanner` to `'hairpin'`.
- Set context property `doubleRepeatBarType` to `":...:"`.
- Set context property `doubleRepeatSegnoBarType` to `":|.S.|:"`.
- Set context property `drumStyleTable` to `#<hash-table 7f3394b088c0 29/61>`.
- Set context property `endRepeatBarType` to `":|."`.
- Set context property `endRepeatSegnoBarType` to `":|.S"`.
- Set context property `explicitClefVisibility` to:
`##(##t ##t ##t)`
- Set context property `explicitCueClefVisibility` to:
`##(##f ##t ##t)`
- Set context property `explicitKeySignatureVisibility` to:
`##(##t ##t ##t)`
- Set context property `extendersOverRests` to `##t`.
- Set context property `extraNatural` to `##t`.
- Set context property `figuredBassAlterationDirection` to `-1`.
- Set context property `figuredBassFormatter` to `format-bass-figure`.
- Set context property `figuredBassLargeNumberAlignment` to `0`.
- Set context property `figuredBassPlusDirection` to `-1`.
- Set context property `figuredBassPlusStrokedAlist` to:
`'((2 . "figbass.twoplus")`
`(4 . "figbass.fourplus")`
`(5 . "figbass.fiveplus")`
`(6 . "figbass.sixstroked")`
`(7 . "figbass.sevenstroked")`
`(9 . "figbass.ninestroked"))`
- Set context property `fineBarType` to `"|."`.
- Set context property `fineSegnoBarType` to `"|.S"`.
- Set context property `fineStartRepeatSegnoBarType` to `"|.S.|:"`.
- Set context property `fineText` to `"Fine"`.
- Set context property `fingeringOrientations` to:
`'(up down)`
- Set context property `firstClef` to `##t`.
- Set context property `forbidBreakBetweenBarLines` to `##t`.
- Set context property `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 context property harmonicAccidentals to #t.
- Set context property highStringOne to #t.
- Set context property initialTimeSignatureVisibility to:
#(#f #t #t)
- Set context property instrumentTransposition to #<Pitch c' >.
- Set context property keepAliveInterfaces to:

```
'(bass-figure-interface
  chord-name-interface
  cluster-beacon-interface
  dynamic-interface
  fret-diagram-interface
  lyric-syllable-interface
  note-head-interface
  tab-note-head-interface
  lyric-interface
  percent-repeat-interface
  stanza-number-interface)
```

- Set context 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 context property lyricMelismaAlignment to -1.
- Set context property majorSevenSymbol to:

```
'(<#<procedure line-markup (a b c)>
  ((#<procedure fontsize-markup (a b c d)>
    -3
    (#<procedure triangle-markup (a b c)> #f))))
```
- Set context property measureBarType to "|".
- Set context property melismaBusyProperties to:

```
'(melismaBusy
  slurMelismaBusy
  tieMelismaBusy
  beamMelismaBusy
  completionBusy)
```
- Set context property metronomeMarkFormatter to format-metronome-markup.
- Set context property middleCClefPosition to -6.
- Set context property middleCPosition to -6.
- Set context property minorChordModifier to:

```
'(<#<procedure simple-markup (a b c)> "m")
```
- Set context property noChordSymbol to:

```
'(<#<procedure simple-markup (a b c)> "N.C.")
```
- Set context property noteNameFunction to note-name-markup.
- Set context property noteNameSeparator to "/".
- Set context property noteToFretFunction to determine-frets.
- Set context property partCombineTextsOnNote to #t.
- Set context property pedalSostenutoStrings to:

```
'("Sost. Ped." "*Sost. Ped." "*")
```
- Set context property pedalSostenutoStyle to 'mixed.
- Set context property pedalSustainStrings to:

```
'("Ped." "*Ped." "*")
```
- Set context property pedalSustainStyle to 'text.
- Set context property pedalUnaCordaStrings to:

```
'("una corda" "" "tre corde")
```
- Set context property pedalUnaCordaStyle to 'text.
- Set context property predefinedDiagramTable to #f.
- Set context property printAccidentalNames to #t.
- Set context property printKeyCancellation to #t.
- Set context property printOctaveNames to #f.
- Set context property printPartCombineTexts to #t.
- Set context property quotedCueEventTypes to:

```
'(note-event
  rest-event
  tie-event
  beam-event
  tuplet-span-event
  tremolo-event)
```

- Set context property `quotedEventTypes` to:
'(StreamEvent)
- Set context property `rehearsalMarkFormatter` to `#<procedure 7f3393db7140 at ice-9/eval.scm:336:13 (a b)>`.
- Set context property `rehearsalMark` to 1.
- Set context property `repeatCountVisibility` to `all-repeat-counts-visible`.
- Set context property `restNumberThreshold` to 1.
- Set context property `scriptDefinitions` to:

```
'((accent
  (avoid-slur . around)
  (padding . 0.2)
  (script-stencil feta "sforzato" . "sforzato")
  (side-relative-direction . -1))
 (accentus
  (script-stencil feta "uaccentus" . "uaccentus")
  (side-relative-direction . -1)
  (avoid-slur . ignore)
  (padding . 0.2)
  (quantize-position . #t)
  (script-priority . -100)
  (direction . 1))
 (altcomma
  (script-stencil feta "laltcomma" . "raltcomma")
  (quantize-position . #t)
  (padding . 0.2)
  (avoid-slur . ignore)
  (direction . 1))
 (circulus
  (script-stencil feta "circulus" . "circulus")
  (side-relative-direction . -1)
  (avoid-slur . ignore)
  (padding . 0.2)
  (quantize-position . #t)
  (script-priority . -100)
  (direction . 1))
 (coda (script-stencil feta "coda" . "coda")
  (padding . 0.2)
  (avoid-slur . outside)
  (direction . 1))
 (comma (script-stencil feta "lcomma" . "rcomma")
  (quantize-position . #t)
  (padding . 0.2)
  (avoid-slur . ignore)
  (direction . 1))
 (downbow
  (script-stencil feta "downbow" . "downbow")
  (padding . 0.2)
  (skyline-horizontal-padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
```

```

    (script-priority . 150))
(downmordent
  (script-stencil
    feta
    "downmordent"
    .
    "downmordent")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(downprall
  (script-stencil feta "downprall" . "downprall")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(espressivo
  (avoid-slur . around)
  (padding . 0.2)
  (script-stencil feta "espr" . "espr")
  (side-relative-direction . -1))
(fermata
  (script-stencil feta "dfermata" . "ufermata")
  (padding . 0.4)
  (avoid-slur . around)
  (script-priority . 4000)
  (direction . 1))
(flageolet
  (script-stencil feta "flageolet" . "flageolet")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(halfopen
  (avoid-slur . outside)
  (padding . 0.2)
  (script-stencil feta "halfopen" . "halfopen")
  (direction . 1))
(halfopenvertical
  (avoid-slur . outside)
  (padding . 0.2)
  (script-stencil
    feta
    "halfopenvertical"
    .
    "halfopenvertical")
  (direction . 1))
(haydnturn
  (script-stencil feta "haydnturn" . "haydnturn")
  (padding . 0.2)
  (avoid-slur . inside)
  (direction . 1))
(henzelongfermata
  (script-stencil

```

```

feta
"dhenzelongfermata"
.
"uhenzelongfermata")
(padding . 0.4)
(avoid-slur . around)
(script-priority . 4000)
(direction . 1))
(henzeshortfermata
(script-stencil
feta
"dhenzeshortfermata"
.
"uhenzeshortfermata")
(padding . 0.4)
(avoid-slur . around)
(script-priority . 4000)
(direction . 1))
(ictus (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 . 0.4)
(avoid-slur . around)
(script-priority . 4000)
(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))
(outsidecomma
  (avoid-slur . around)
  (direction . 1)
  (padding . 0.2)
  (script-stencil feta "lcomma" . "rcomma"))
(portato
  (script-stencil feta "uportato" . "dportato")
  (avoid-slur . around)
  (padding . 0.45)
  (side-relative-direction . -1))
(prall (script-stencil feta "prall" . "prall")
      (padding . 0.2)
      (avoid-slur . around)
      (direction . 1))
(pralldown
  (script-stencil feta "pralldown" . "pralldown")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(prallmordent
  (script-stencil
    feta
    "prallmordent"
    .
    "prallmordent")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(prallprall
  (script-stencil feta "prallprall" . "prallprall")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(prallup
  (script-stencil feta "prallup" . "prallup")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(reverseturn
  (script-stencil
    feta

```

```

    "reverseturn"
    .
    "reverseturn")
(padding . 0.2)
(avoid-slur . inside)
(direction . 1))
(rheel (script-stencil feta "dpedalheel" . "dpedalheel")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(rtoe (script-stencil feta "dpedaltoe" . "dpedaltoe")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1))
(segno (script-stencil feta "segno" . "segno")
  (padding . 0.2)
  (avoid-slur . outside)
  (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 . 0.4)
  (avoid-slur . around)
  (script-priority . 4000)
  (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)
  (script-priority . -50)
  (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 . 0.4)
  (avoid-slur . around)
  (script-priority . 4000)
  (direction . 1))
(veryshortfermata
  (script-stencil
    feta
    "dveryshortfermata"
    .
    "uveryshortfermata")
  (padding . 0.4)
  (avoid-slur . around)
  (script-priority . 4000)
  (direction . 1)))

```

- Set context property `sectionBarType` to `"||"`.
- Set context property `segnoBarType` to `"S"`.

- Set context property segnoMarkFormatter to format-segno-mark-considering-bar-lines.
- Set context property segnoStyle to 'mark.
- Set context property slashChordSeparator to:
'(<#<procedure simple-markup (a b c)> "/">)
- Set context property soloIIIText to "Solo II".
- Set context property soloText to "Solo".
- Set context property startRepeatBarType to ".|:".
- Set context property startRepeatSegnoBarType to "S.|:".
- Set context property stringNumberOrientations to:
'(up down)
- Set context property stringOneTopmost to #t.
- Set context property stringTunings to:
'(<#<Pitch e' >
#<Pitch b >
#<Pitch g >
#<Pitch d >
#<Pitch a, >
#<Pitch e, >)
- Set context property strokeFingerOrientations to:
'(right)
- Set context property subdivideBeams to #f.
- Set context property suspendMelodyDecisions to #f.
- Set context property systemStartDelimiter to 'SystemStartBar.
- Set context property tablatureFormat to fret-number-tablature-format.
- Set context property tabStaffLineLayoutFunction to tablature-position-on-lines.
- Set context property tieWaitForNote to #f.
- Set context property timeSignatureFraction to:
'(4 . 4)
- Set context property timeSignatureSettings to:
'(((2 . 2) (beamExceptions (end (1/32 8 8 8 8))))
((3 . 2)
(beamExceptions (end (1/32 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))))
((12 . 4)
(beamExceptions

`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.

`centerBarNumbers` (boolean)

Whether to center bar numbers in their measure instead of aligning them on the bar line.

`currentBarNumber` (integer)

Contains the current barnumber. This property is incremented at every bar line.

`currentCommandColumn` (graphical (layout) object)

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

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`measurePosition` (moment)

How much of the current measure have we had. This can be set manually to create incomplete measures.

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `BarNumber` (page 489), and `CenteredBarNumber` (page 506).

`Beam_collision_engraver` (page 408)

Help beams avoid colliding with notes and clefs in other voices.

`Break_align_engraver` (page 411)

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): `BreakAlignGroup` (page 500), `BreakAlignment` (page 501), and `LeftEdge` (page 571).

`Centered_bar_number_align_engraver` (page 412)

Group measure-centered bar numbers in a `CenteredBarNumberLineSpanner` so they end up on the same vertical position.

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s):

`CenteredBarNumberLineSpanner` (page 507).

`Concurrent_hairpin_engraver` (page 415)

Collect concurrent hairpins.

`Footnote_engraver` (page 423)

Create footnote texts.

This engraver creates the following layout object(s): `Footnote` (page 549).

`Grace_spacing_engraver` (page 426)

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): `GraceSpacing` (page 553).

`Jump_engraver` (page 428)

This engraver creates instructions such as *D.C.* and *Fine*, placing them vertically outside the set of staves given in the `stavesFound` context property.

If `Jump_engraver` is added or moved to another context, `Staff_collecting_engraver` (page 448), also needs to be there so that marks appear at the intended Y location.

Music types accepted: `ad-hoc-jump-event` (page 48), `dal-segno-event` (page 51), and `fine-event` (page 51),

Properties (read)

`codaMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

`codaMarkFormatter` (procedure)

A procedure that creates a coda mark (which in conventional *D.S. al Coda* form indicates the start of the alternative endings), taking as arguments the mark sequence number and the context. It should return a markup object.

`dalSegnoTextFormatter` (procedure)

Format a jump instruction such as *D.S.*

The first argument is the context.

The second argument is the number of times the instruction is performed.

The third argument is a list of three markups: *start-markup*, *end-markup*, and *next-markup*.

If *start-markup* is #f, the form is *da capo*; otherwise the form is *dal segno* and *start-markup* is the sign at the start of the repeated section.

If *end-markup* is not #f, it is either the sign at the end of the main body of the repeat, or it is a *Fine* instruction. When it is a *Fine* instruction, *next-markup* is #f.

If *next-markup* is not #f, it is the mark to be jumped to after performing the body of the repeat, e.g., Coda.

`finalFineTextVisibility` (boolean)

Whether `\fine` at the written end of the music should create a *Fine* instruction.

`fineText` (markup)

The text to print at `\fine`.

`segnoMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

`segnoMarkFormatter` (procedure)

A procedure that creates a segno (which conventionally indicates the start of a repeated section), taking as arguments the mark sequence number and the context. It should return a markup object.

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `JumpScript` (page 561).

`Mark_engraver` (page 432)

This engraver creates rehearsal marks, segno and coda marks, and section labels.

`Mark_engraver` creates marks, formats them, and places them vertically outside the set of staves given in the `stavesFound` context property.

If `Mark_engraver` is added or moved to another context, `Staff_collecting_engraver` (page 448), also needs to be there so that marks appear at the intended Y location.

By default, `Mark_engravers` in multiple contexts create a common sequence of marks chosen by the Score-level `Mark_tracking_translator` (page 433). If independent sequences are desired, multiple `Mark_tracking_translators` must be used.

Properties (read)

`codaMarkFormatter` (procedure)

A procedure that creates a coda mark (which in conventional *D.S. al Coda* form indicates the start of the alternative endings), taking as arguments the mark sequence number and the context. It should return a markup object.

`currentPerformanceMarkEvent` (stream event)

The coda, section, or segno mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`currentRehearsalMarkEvent` (stream event)

The ad-hoc or rehearsal mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`rehearsalMarkFormatter` (procedure)

A procedure taking as arguments the context and the sequence number of the rehearsal mark. It should return the formatted mark as a markup object.

`segnoMarkFormatter` (procedure)

A procedure that creates a segno (which conventionally indicates the start of a repeated section), taking as arguments the mark sequence number and the context. It should return a markup object.

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `CodaMark` (page 515), `RehearsalMark` (page 607), `SectionLabel` (page 614), and `SegnoMark` (page 616).

`Mark_tracking_translator` (page 433)

This translator chooses which marks `Mark_engraver` should engrave.

Music types accepted: `ad-hoc-mark-event` (page 49), `coda-mark-event` (page 50), `rehearsal-mark-event` (page 55), `section-label-event` (page 56), and `segno-mark-event` (page 56),

Properties (read)

`codaMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

`rehearsalMark` (integer)

The next rehearsal mark to print.

`segnoMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

Properties (write)

`codaMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

`currentPerformanceMarkEvent` (stream event)

The coda, section, or segno mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`currentRehearsalMarkEvent` (stream event)

The ad-hoc or rehearsal mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`rehearsalMark` (integer)

The next rehearsal mark to print.

segnoMarkCount (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

Metronome_mark_engraver (page 436)

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 2.2.135 [Staff_collecting_engraver], page 448.

Music types accepted: tempo-change-event (page 58),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): MetronomeMark (page 585).

Output_property_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 49),

Paper_column_engraver (page 440)

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: break-event (page 50), and label-event (page 52),

Properties (read)

forbidBreak (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

Properties (write)

currentCommandColumn (graphical (layout) object)

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

`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, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to `#t` when an event forcing a line break was heard.

This engraver creates the following layout object(s): `NonMusicalPaperColumn` (page 593), and `PaperColumn` (page 599).

`Parenthesis_engraver` (page 441)

Parenthesize objects whose `parenthesize` property is `#t`.

This engraver creates the following layout object(s): `Parentheses` (page 600).

`Repeat_acknowledge_engraver` (page 444)

This translator adds entries to `repeatCommands` for events generated by `\\repeat volta`.

Music types accepted: `volta-repeat-end-event` (page 59), and `volta-repeat-start-event` (page 59),

Properties (write)

`repeatCommands` (list)

A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'(start-repeat)` may be given as `'(start-repeat)`.

`end-repeat`

End a repeated section.

`start-repeat`

Start a repeated section.

`volta text`

If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`Show_control_points_engraver` (page 446)

Create grobs to visualize control points of Bézier curves (ties and slurs) for ease of tweaking.

This engraver creates the following layout object(s): `ControlPoint` (page 519), and `ControlPolygon` (page 520).

`Spacing_engraver` (page 447)

Make a `SpacingSpanner` and do bookkeeping of shortest starting and playing notes.

Music types accepted: `spacing-section-event` (page 56),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `SpacingSpanner` (page 625).

`Spanner_tracking_engraver` (page 448)

Helper for creating spanners attached to other spanners. If a spanner has the `sticky-grob-interface`, the engraver tracks the spanner contained in its `sticky-host` object. When the host ends, the sticky spanner attached to it has its end announced too.

`Staff_collecting_engraver` (page 448)

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.

`Stanza_number_align_engraver` (page 450)

This engraver ensures that stanza numbers are neatly aligned.

`System_start_delimiter_engraver` (page 450)

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 items (clef, key signature, etc.).

`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): `SystemStartBar` (page 644), `SystemStartBrace` (page 645), `SystemStartBracket` (page 645), and `SystemStartSquare` (page 646).

`Text_mark_engraver` (page 452)

Engraves arbitrary textual marks.

Music types accepted: `text-mark-event` (page 58),

Properties (read)

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `TextMark` (page 649).

`Timing_translator` (page 454)

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`.

Music types accepted: `alternative-event` (page 49), `bar-event` (page 49), and `fine-event` (page 51),

Properties (read)

`alternativeNumberingStyle` (symbol)

The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to numbers to reset the bar number at each alternative, or set to `numbers-with-letters` to reset and also include letter suffixes.

`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 incremented at every bar line.

`internalBarNumber` (integer)

Contains the current barnumber. This property is used for internal time-keeping, 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)

`alternativeNumber` (non-negative, exact integer)

When set, the index of the current `\alternative` element, starting from one. Not set outside of alternatives. Note the distinction from `volta number`: an alternative may pertain to multiple `volte`.

`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 incremented at every bar line.

`internalBarNumber` (integer)

Contains the current barnumber. This property is used for internal time-keeping, 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.

`measureStartNow` (boolean)

True at the beginning of a measure.

`timeSignatureFraction` (fraction, as pair)

A pair of numbers, signifying the time signature. For example, '(4 . 4)' is a 4/4 time signature.

`Tweak_engraver` (page 456)

Read the tweaks property from the originating event, and set properties.

`Vertical_align_engraver` (page 456)

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): `StaffGrouper` (page 630), and `VerticalAlignment` (page 669).

`Volta_engraver` (page 457)

Make volta brackets.

Music types accepted: `dal-segno-event` (page 51), `fine-event` (page 51), and `volta-span-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`repeatCommands` (list)

A list of commands related to volta-style repeats. In general, each element is a list, '(*command args...*)', but a command with no arguments may be abbreviated to a symbol; e.g., '((start-repeat))' may be given as '(start-repeat)'.

end-repeat

End a repeated section.

start-repeat

Start a repeated section.

volta *text*

If *text* is markup, start a volta bracket with that label; if *text* is #f, end a volta bracket.

`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): `VoltaBracket` (page 673), and `VoltaBracketSpanner` (page 674).

2.1.34 StandaloneRhythmStaff

A Staff-level context for use by `\markup \rhythm`.

This context also accepts commands for the following context(s): `Staff` (page 287), and `Staff` (page 287).

This context creates the following layout object(s): `BarLine` (page 486), `BreathingSign` (page 502), `CaesuraScript` (page 505), `DotColumn` (page 531), `InstrumentName` (page 559), `LedgerLineSpanner` (page 570), `StaffHighlight` (page 631), `StaffSpacing` (page 632), `StaffSymbol` (page 632), and `VerticalAxisGroup` (page 670).

This context sets the following properties:

- Set context property `createSpacing` to `#t`.
- Set context property `instrumentName` to `'()`.
- Set context property `localAlterations` to `'()`.
- Set context property `shortInstrumentName` to `'()`.
- Set context property `squashedPosition` to 0.
- Set context property `squashedPosition` to 1.
- Set grob property `line-count` in `StaffSymbol` (page 632), to 0.
- Set grob property `line-count` in `StaffSymbol` (page 632), to 1.
- Set grob property `neutral-direction` in `Beam` (page 495), to 1.
- Set grob property `neutral-direction` in `Stem` (page 634), to 1.
- Set grob property `staff-padding` in `VoltaBracket` (page 673), to 3.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type `StandaloneRhythmVoice` (page 331).

Context `StandaloneRhythmStaff` can contain `CueVoice` (page 98), `NullVoice` (page 228), `StandaloneRhythmVoice` (page 331), and `Voice` (page 390).

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

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Bar_engraver` (page 404)

Create bar lines for various commands, including `\\bar`.

If `forbidBreakBetweenBarLines` is true, allow line breaks at bar lines only.

Music types accepted: `ad-hoc-jump-event` (page 48), `caesura-event` (page 50), `coda-mark-event` (page 50), `dal-segno-event` (page 51), `fine-event` (page 51), `section-event` (page 56), `segno-mark-event` (page 56), and `volta-span-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...'`.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|:'`.

`endRepeatBarType` (string)

Bar line to insert at the end of a `\repeat volta`. The default is `':|..'`.

`endRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S.'`.

`fineBarType` (string)

Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'|.'`.

`fineSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with `\fine`. The default is `'|.S.'`.

`fineStartRepeatSegnoBarType` (string)
 Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `'|.S.|:'`.

`forbidBreakBetweenBarLines` (boolean)
 If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)
 Bar line to insert at a measure boundary.

`repeatCommands` (list)
 A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`
 End a repeated section.

`start-repeat`
 Start a repeated section.

`volta text`
 If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`sectionBarType` (string)
 Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`segnoBarType` (string)
 Bar line to insert at an in-staff segno. The default is `'S'`.

`segnoStyle` (symbol)
 A symbol that indicates how to print a segno: `bar-line` or `mark`.

`startRepeatBarType` (string)
 Bar line to insert at the start of a `\repeat volta`. The default is `'|.|:'`.

`startRepeatSegnoBarType` (string)
 Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is `'S.|:'`.

`underlyingRepeatBarType` (string)
 Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`whichBar` (string)
 The current bar line type, or `'()` if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

Properties (write)

`currentBarLine` (graphical (layout) object)
 Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): `BarLine` (page 486).

`Caesura_engraver` (page 411)

Notate a short break in sound that does not shorten the previous note.

Depending on the result of passing the value of `caesuraType` through `caesuraTypeTransform`, this engraver may create a `BreathingSign` with `CaesuraScript` grobs aligned to it, or it may create `CaesuraScript` grobs and align them to a `BarLine`.

If this engraver observes a `BarLine`, it calls `caesuraTypeTransform` again with the new information, and if necessary, recreates its grobs.

Music types accepted: `caesura-event` (page 50),

Properties (read)

`breathMarkDefinitions` (list)

The description of breath marks. This is used by the `Breathing_sign_engraver`. See `scm/breath.scm` for more information.

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`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): `BreathingSign` (page 502), and `CaesuraScript` (page 505).

Dot_column_engraver (page 418)

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): DotColumn (page 531).

Font_size_engraver (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

Instrument_name_engraver (page 427)

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 items (clef, key signature, etc.).

`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): `InstrumentName` (page 559).

Ledger_line_engraver (page 431)

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 570).

Output_property_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

Pitch_squash_engraver (page 443)

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*.

Separating_line_group_engraver (page 446)

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)

Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)

True if currentCommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s): StaffSpacing (page 632).

Staff_highlight_engraver (page 449)

Highlights music passages.

Music types accepted: staff-highlight-event (page 57),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

This engraver creates the following layout object(s): StaffHighlight (page 631).

Staff_symbol_engraver (page 449)

Create the constellation of five (default) staff lines.

Music types accepted: staff-span-event (page 57),

This engraver creates the following layout object(s): StaffSymbol (page 632).

2.1.35 StandaloneRhythmVoice

A Voice-level context for use by \markup \rhythm.

This context also accepts commands for the following context(s): Voice (page 390).

This context creates the following layout object(s): Arpeggio (page 483), Beam (page 495), BendAfter (page 497), BreathingSign (page 502), ClusterSpanner (page 514), ClusterSpannerBeacon (page 515), CombineTextScript (page 517), Dots (page 531), DoublePercentRepeat (page 532), DoublePercentRepeatCounter (page 534), DoubleRepeatSlash (page 535), DynamicLineSpanner (page 538), DynamicText (page 539), DynamicTextSpanner (page 541), FingerGlideSpanner (page 544), Fingering (page 545), Flag (page 548), Glissando (page 552), Hairpin (page 555), InstrumentSwitch (page 560), LaissezVibrerTie (page 569), LaissezVibrerTieColumn (page 570), LigatureBracket (page 573), MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), MultiMeasureRestText (page 591), NoteColumn (page 595), NoteHead (page 596), NoteSpacing (page 597), PercentRepeat (page 601), PercentRepeatCounter (page 602), PhrasingSlur (page 604), RepeatSlash (page 608), RepeatTie (page 609), RepeatTieColumn (page 610), Rest (page 611), Script (page 612), ScriptColumn (page 613), Slur (page 621), Stem (page 634), StemStub (page 636), StemTremolo (page 636), StringNumber (page 637), StrokeFinger (page 639), TextScript (page 651), TextSpanner (page 653), Tie (page 654), TieColumn (page 656), TrillPitchAccidental (page 659), TrillPitchGroup (page 660), TrillPitchHead (page 661), TrillPitchParentheses (page 662), TrillSpanner (page 662), TupletBracket (page 664), TupletNumber (page 665), and VoiceFollower (page 672).

This context sets the following properties:

- Set grob property direction in Stem (page 634), 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):

Arpeggio_engraver (page 403)

Generate an Arpeggio symbol.

Music types accepted: arpeggio-event (page 49),

This engraver creates the following layout object(s): Arpeggio (page 483).

Auto_beam_engraver (page 403)

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 2.2.141 [Stem_engraver], page 450, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 49),

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): Beam (page 495).

Beam_engraver (page 408)

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: beam-event (page 49),

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): Beam (page 495).

Bend_engraver (page 410)

Create fall spanners.

Music types accepted: bend-after-event (page 49),

Properties (read)

- `currentBarLine` (graphical (layout) object)
Set to the BarLine that Bar_engraver has created in the current timestep.
- `currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable items (clef, key signature, etc.).
- `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): BendAfter (page 497).

Breathing_sign_engraver (page 411)

Notate breath marks.

Music types accepted: breathing-event (page 50),

Properties (read)

- `breathMarkType` (symbol)
The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 502).

Chord_tremolo_engraver (page 413)

Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 59),

This engraver creates the following layout object(s): Beam (page 495).

Cluster_spanner_engraver (page 414)

Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 50),

This engraver creates the following layout object(s): ClusterSpanner (page 514), and ClusterSpannerBeacon (page 515).

Dots_engraver (page 418)

Create Section 3.1.43 [Dots], page 531, objects for Section 3.2.118 [rhythmic-head-interface], page 736s.

This engraver creates the following layout object(s): Dots (page 531).

Double_percent_repeat_engraver (page 418)

Make double measure repeats.

Music types accepted: double-percent-event (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 532), and `DoublePercentRepeatCounter` (page 534).

`Dynamic_align_engraver` (page 420)

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): `DynamicLineSpanner` (page 538).

`Dynamic_engraver` (page 420)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 48), `break-dynamic-span-event` (page 50), and `span-dynamic-event` (page 56),

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): `DynamicText` (page 539), `DynamicTextSpanner` (page 541), and `Hairpin` (page 555).

`Finger_glide_engraver` (page 422)

Engraver to print a line between two Fingering grobs.

Music types accepted: `note-event` (page 54),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 544).

`Fingering_engraver` (page 423)

Create fingering scripts.

Music types accepted: `fingering-event` (page 51),

This engraver creates the following layout object(s): `Fingering` (page 545).

Font_size_engraver (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

Forbid_line_break_engraver (page 423)

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, except if explicitly requested by the user.

Glissando_engraver (page 424)

Engrave glissandi.

Music types accepted: `glissando-event` (page 52),

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): `Glissando` (page 552).

Grace_auto_beam_engraver (page 425)

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: `beam-forbid-event` (page 49),

Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 495).

Grace_beam_engraver (page 425)

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: `beam-event` (page 49),

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): Beam (page 495).

Grace_engraver (page 425)

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.

Grob_pq_engraver (page 426)

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.).

Instrument_switch_engraver (page 428)

Create a cue text for taking instrument.

This engraver is deprecated.

Properties (read)

instrumentCueName (markup)

The name to print if another instrument is to be taken.

This property is deprecated

This engraver creates the following layout object(s): InstrumentSwitch (page 560).

Laissez_vibrer_engraver (page 431)

Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 52),

This engraver creates the following layout object(s): LaissezVibrerTie (page 569), and LaissezVibrerTieColumn (page 570).

Ligature_bracket_engraver (page 431)

Handle Ligature_events by engraving Ligature brackets.

Music types accepted: ligature-event (page 52),

This engraver creates the following layout object(s): LigatureBracket (page 573).

Multi_measure_rest_engraver (page 437)

Engrave multi-measure rests that are produced with 'R'. It reads measureStartNow and internalBarNumber to determine what number to print over the Section 3.1.88 [MultiMeasureRest], page 587.

Music types accepted: multi-measure-articulation-event (page 53), multi-measure-rest-event (page 53), and multi-measure-text-event (page 53), Properties (read)

currentCommandColumn (graphical (layout) object)

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

internalBarNumber (integer)

Contains the current barnumber. This property is used for internal time-keeping, among others by the Accidental_engraver.

measureStartNow (boolean)

True at the beginning of a measure.

restNumberThreshold (number)

If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), and MultiMeasureRestText (page 591).

New_fingering_engraver (page 437)

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): Fingering (page 545), Script (page 612), StringNumber (page 637), and StrokeFinger (page 639).

Note_head_line_engraver (page 438)

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): VoiceFollower (page 672).

Note_heads_engraver (page 438)

Generate note heads.

Music types accepted: note-event (page 54),

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): `NoteHead` (page 596).

`Note_spacing_engraver` (page 439)

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

This engraver creates the following layout object(s): `NoteSpacing` (page 597).

`Output_property_engraver` (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Part_combine_engraver` (page 441)

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

Music types accepted: `note-event` (page 54), and `part-combine-event` (page 55),

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): `CombineTextScript` (page 517).

`Percent_repeat_engraver` (page 441)

Make whole measure repeats.

Music types accepted: `percent-event` (page 55),

Properties (read)

`countPercentRepeats` (boolean)

If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)

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

`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): `PercentRepeat` (page 601), and `PercentRepeatCounter` (page 602).

Phrasing_slur_engraver (page 442)

Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 447.

Music types accepted: note-event (page 54), and phrasing-slur-event (page 55),

This engraver creates the following layout object(s): PhrasingSlur (page 604).

Pitched_trill_engraver (page 443)

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): TrillPitchAccidental (page 659), TrillPitchGroup (page 660), TrillPitchHead (page 661), and TrillPitchParentheses (page 662).

Repeat_tie_engraver (page 444)

Create repeat ties.

Music types accepted: repeat-tie-event (page 55),

This engraver creates the following layout object(s): RepeatTie (page 609), and RepeatTieColumn (page 610).

Rest_engraver (page 444)

Engrave rests.

Music types accepted: rest-event (page 55),

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): Rest (page 611).

Rhythmic_column_engraver (page 445)

Generate NoteColumn, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): NoteColumn (page 595).

Script_column_engraver (page 445)

Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.

This engraver creates the following layout object(s): ScriptColumn (page 613).

Script_engraver (page 445)

Handle note scripted articulations.

Music types accepted: articulation-event (page 49),

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): Script (page 612).

Slash_repeat_engraver (page 447)

Make beat repeats.

Music types accepted: repeat-slash-event (page 55),

This engraver creates the following layout object(s): DoubleRepeatSlash (page 535), and RepeatSlash (page 608).

`Slur_engraver` (page 447)

Build slur grobs from slur events.

Music types accepted: `note-event` (page 54), and `slur-event` (page 56),

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): `Slur` (page 621).

`Spanner_break_forbid_engraver` (page 448)

Forbid breaks in certain spanners.

`Stem_engraver` (page 450)

Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 58), and `tuplet-span-event` (page 59),

Properties (read)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`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`.

This engraver creates the following layout object(s): `Flag` (page 548), `Stem` (page 634), `StemStub` (page 636), and `StemTremolo` (page 636).

`Text_engraver` (page 452)

Create text scripts.

Music types accepted: `text-script-event` (page 58),

This engraver creates the following layout object(s): `TextScript` (page 651).

`Text_spanner_engraver` (page 453)

Create text spanner from an event.

Music types accepted: `text-span-event` (page 58),

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): `TextSpanner` (page 653).

`Tie_engraver` (page 453)

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 58),

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): `Tie` (page 654), and `TieColumn` (page 656).

`Trill_spanner_engraver` (page 455)

Create trill spanners.

Music types accepted: `trill-span-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `TrillSpanner` (page 662).

`Tuplet_engraver` (page 456)

Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 59),

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): `TupletBracket` (page 664), and `TupletNumber` (page 665).

2.1.36 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` (page 287).

This context creates the following layout object(s): `BarLine` (page 486), `BassFigure` (page 491), `BassFigureAlignment` (page 492), `BassFigureAlignmentPositioning` (page 492), `BassFigureBracket` (page 493), `BassFigureContinuation` (page 494), `BassFigureLine` (page 494), `BreathingSign` (page 502), `CaesuraScript` (page 505), `Clef` (page 510), `ClefModifier` (page 513), `CueClef` (page 521), `CueEndClef` (page 524), `DotColumn` (page 531), `FingeringColumn` (page 547), `InstrumentName` (page 559),

LedgerLineSpanner (page 570), NoteCollision (page 594), PianoPedalBracket (page 605), RestCollision (page 612), ScriptColumn (page 613), ScriptRow (page 614), SostenuatoPedal (page 623), SostenuatoPedalLineSpanner (page 624), StaffEllipsis (page 628), StaffHighlight (page 631), StaffSpacing (page 632), StaffSymbol (page 632), SustainPedal (page 640), SustainPedalLineSpanner (page 641), TimeSignature (page 657), UnaCordaPedal (page 666), UnaCordaPedalLineSpanner (page 667), and VerticalAxisGroup (page 670).

This context sets the following properties:

- Set context property `autoBeaming` to `#f`.
- Set context property `clefGlyph` to `"clefs.tab"`.
- Set context property `clefPosition` to `0`.
- Set context property `createSpacing` to `#t`.
- Set context property `handleNegativeFrets` to `'recalculate`.
- Set context property `ignoreFiguredBassRest` to `#f`.
- Set context property `instrumentName` to `'()`.
- Set context property `localAlterations` to `'()`.
- Set context property `ottavationMarkups` to:


```
'((4 . "29")
  (3 . "22")
  (2 . "15")
  (1 . "8")
  (-1 . "8")
  (-2 . "15")
  (-3 . "22")
  (-4 . "29"))
```
- Set context property `restrainOpenStrings` to `#f`.
- Set context property `shortInstrumentName` to `'()`.
- Set grob property `after-line-breaking` in `RepeatTie` (page 609), to `repeat-tie::handle-tab-note-head`.
- Set grob property `after-line-breaking` in `Tie` (page 654), to `tie::handle-tab-note-head`.
- Set grob property `avoid-note-head` in `Stem` (page 634), to `#t`.
- Set grob property `beam-thickness` in `Beam` (page 495), to `0.32`.
- Set grob property `beam-thickness` in `StemTremolo` (page 636), to `0.32`.
- Set grob property `beam-width` in `StemTremolo` (page 636), to `stem-tremolo::calc-tab-width`.
- Set grob property `bound-details.left` in `Glissando` (page 552), to :


```
'((attach-dir . 1) (padding . 0.3))
```
- Set grob property `bound-details.right` in `Glissando` (page 552), to :


```
'((attach-dir . -1) (padding . 0.3))
```
- Set grob property `control-points` in `Slur` (page 621), to `#<unpure-pure-container #<procedure 7f3393eb28e0 at ice-9/eval.scm:333:13 (a)> #<procedure 7f3393eb28c0 at ice-9/eval.scm:386:13 (a . rest)>>`.
- Set grob property `details` in `Stem` (page 634), to :


```
'((lengths 0 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 Glissando (page 552), to `glissando::calc-tab-extra-dy`.
- Set grob property glyph-name in TabNoteHead (page 647), to `tab-note-head::calc-glyph-name`.
- Set grob property ignore-collision in NoteColumn (page 595), to `#t`.
- Set grob property length-fraction in Beam (page 495), to 0.62.
- Set grob property length-fraction in StemTremolo (page 636), to `#<procedure 7f3394a9e320 at ice-9/eval.scm:333:13 (a)>`.
- Set grob property no-stem-extend in Stem (page 634), to `#t`.
- Set grob property staff-space in StaffSymbol (page 632), to 1.5.
- Set grob property stencil in Arpeggio (page 483), to `#f`.
- Set grob property stencil in Beam (page 495), to `#f`.
- Set grob property stencil in Clef (page 510), to `clef::print-modern-tab-if-set`.
- Set grob property stencil in Dots (page 531), to `#f`.
- Set grob property stencil in DynamicTextSpanner (page 541), to `#f`.
- Set grob property stencil in DynamicText (page 539), to `#f`.
- Set grob property stencil in Flag (page 548), to `#f`.
- Set grob property stencil in Glissando (page 552), to `glissando::draw-tab-glissando`.
- Set grob property stencil in Hairpin (page 555), to `#f`.
- Set grob property stencil in LaissezVibrerTie (page 569), to `#f`.
- Set grob property stencil in MultiMeasureRestNumber (page 588), to `#f`.
- Set grob property stencil in MultiMeasureRestScript (page 590), to `#f`.
- Set grob property stencil in MultiMeasureRestText (page 591), to `#f`.
- Set grob property stencil in MultiMeasureRest (page 587), to `#f`.
- Set grob property stencil in PhrasingSlur (page 604), to `#f`.
- Set grob property stencil in RepeatTie (page 609), to `#f`.
- Set grob property stencil in Rest (page 611), to `#f`.
- Set grob property stencil in Script (page 612), to `#f`.
- Set grob property stencil in StemTremolo (page 636), to `#f`.
- Set grob property stencil in Stem (page 634), to `#f`.
- Set grob property stencil in TabNoteHead (page 647), to `tab-note-head::whiteout-if-style-set`.
- Set grob property stencil in TextScript (page 651), to `#f`.
- Set grob property stencil in TextSpanner (page 653), to `#f`.
- Set grob property stencil in Tie (page 654), to `#f`.
- Set grob property stencil in TimeSignature (page 657), to `#f`.
- Set grob property stencil in TupletBracket (page 664), to `#f`.
- Set grob property stencil in TupletNumber (page 665), to `#f`.
- Set grob property style in Flag (page 548), to `'no-flag`.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type TabVoice (page 353).

Context TabStaff can contain CueVoice (page 98), NullVoice (page 228), and TabVoice (page 353).

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

Alteration_glyph_engraver (page 402)

Set the glyph-name-alist of all grobs having the accidental-switch-interface to the value of the context’s alterationGlyphs property, when defined.

Properties (read)

alterationGlyphs (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., -1/2 for flat. This applies to all grobs that can print accidentals.

Axis_group_engraver (page 404)

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 items (clef, key signature, etc.).

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): VerticalAxisGroup (page 670).

Bar_engraver (page 404)

Create bar lines for various commands, including `\\bar`.

If `forbidBreakBetweenBarLines` is true, allow line breaks at bar lines only.

Music types accepted: `ad-hoc-jump-event` (page 48), `caesura-event` (page 50), `coda-mark-event` (page 50), `dal-segno-event` (page 51), `fine-event` (page 51), `section-event` (page 56), `segno-mark-event` (page 56), and `volta-span-event` (page 59),

Properties (read)

caesuraType (list)

An alist

((bar-line . bar-type)

(breath . breath-type)

(scripts . script-type...)

(underlying-bar-line . bar-type))

specifying which breath mark, bar line, and scripts to create at `\\caesura`. All entries are optional.

bar-line has higher priority than a measure bar line and underlying-bar-line has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...:'`.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|:'`.

`endRepeatBarType` (string)

Bar line to insert at the end of a `\repeat volta`. The default is `':|.'`.

`endRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S'`.

`fineBarType` (string)

Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'|.'`.

`fineSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with `\fine`. The default is `'|.S'`.

`fineStartRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `'|.S.|:'`.

`forbidBreakBetweenBarLines` (boolean)

If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)

Bar line to insert at a measure boundary.

`repeatCommands` (list)

A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`
End a repeated section.

`start-repeat`
Start a repeated section.

`volta text`
If *text* is markup, start a volta bracket with that label; if *text* is `#f`, end a volta bracket.

`sectionBarType (string)`
Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'|'`.

`segnoBarType (string)`
Bar line to insert at an in-staff segno. The default is `'S'`.

`segnoStyle (symbol)`
A symbol that indicates how to print a segno: `bar-line` or `mark`.

`startRepeatBarType (string)`
Bar line to insert at the start of a `\repeat volta`. The default is `'.|:'`.

`startRepeatSegnoBarType (string)`
Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is `'S.|:'`.

`underlyingRepeatBarType (string)`
Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'|'`.

`whichBar (string)`
The current bar line type, or `'()` if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

Properties (write)

`currentBarLine (graphical (layout) object)`
Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`forbidBreak (boolean)`
If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): `BarLine` (page 486).

`Caesura_engraver` (page 411)

Notate a short break in sound that does not shorten the previous note.

Depending on the result of passing the value of `caesuraType` through `caesuraTypeTransform`, this engraver may create a `BreathingSign` with `CaesuraScript` grobs aligned to it, or it may create `CaesuraScript` grobs and align them to a `BarLine`.

If this engraver observes a `BarLine`, it calls `caesuraTypeTransform` again with the new information, and if necessary, recreates its grobs.

Music types accepted: `caesura-event` (page 50),

Properties (read)

`breathMarkDefinitions` (list)

The description of breath marks. This is used by the `Breathing_sign_engraver`. See `scm/breath.scm` for more information.

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`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): `BreathingSign` (page 502), and `CaesuraScript` (page 505).

`Clef_engraver` (page 413)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `Clef` (page 510), and `ClefModifier` (page 513).

`Collision_engraver` (page 414)

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): `NoteCollision` (page 594).

`Cue_clef_engraver` (page 416)

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`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): `ClefModifier` (page 513), `CueClef` (page 521), and `CueEndClef` (page 524).

`Dot_column_engraver` (page 418)

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): `DotColumn` (page 531).

`Figured_bass_engraver` (page 421)

Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 49), and `rest-event` (page 55),

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): `BassFigure` (page 491),

`BassFigureAlignment` (page 492), `BassFigureBracket` (page 493),

`BassFigureContinuation` (page 494), and `BassFigureLine` (page 494).

`Figured_bass_position_engraver` (page 422)

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

`BassFigureAlignmentPositioning` (page 492).

`Fingering_column_engraver` (page 422)

Find potentially colliding scripts and put them into a `FingeringColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `FingeringColumn` (page 547).

`Font_size_engraver` (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

`Grob_pq_engraver` (page 426)

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.).

Instrument_name_engraver (page 427)

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 items (clef, key signature, etc.).

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): InstrumentName (page 559).

Ledger_line_engraver (page 431)

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): LedgerLineSpanner (page 570).

Merge_mmrest_numbers_engraver (page 435)

Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

Non_musical_script_column_engraver (page 438)

Find potentially colliding non-musical scripts and put them into a ScriptColumn object; that will fix the collisions.

This engraver creates the following layout object(s): ScriptColumn (page 613).

Output_property_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 49),

Piano_pedal_align_engraver (page 442)

Align piano pedal symbols and brackets.

Properties (read)

currentCommandColumn (graphical (layout) object)

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

This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 624), `SustainPedalLineSpanner` (page 641), and `UnaCordaPedalLineSpanner` (page 667).

`Piano_pedal_engraver` (page 442)

Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 56), `sustain-event` (page 58), and `una-corda-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `PianoPedalBracket` (page 605), `SostenutoPedal` (page 623), `SustainPedal` (page 640), and `UnaCordaPedal` (page 666).

`Pure_from_neighbor_engraver` (page 443)

Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 444)

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): `RestCollision` (page 612).

`Script_row_engraver` (page 445)

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 614).

`Separating_line_group_engraver` (page 446)

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)

Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)

True if `currentCommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 632).

`Skip_typesetting_engraver` (page 446)

Create a `StaffEllipsis` when `skipTypesetting` is used.

Properties (read)

`skipTypesetting` (boolean)

If true, no typesetting is done, speeding up the interpretation phase.

Useful for debugging large scores.

This engraver creates the following layout object(s): `StaffEllipsis` (page 628).

`Staff_collecting_engraver` (page 448)

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_highlight_engraver` (page 449)

Highlights music passages.

Music types accepted: `staff-highlight-event` (page 57),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `StaffHighlight` (page 631).

`Staff_symbol_engraver` (page 449)

Create the constellation of five (default) staff lines.

Music types accepted: `staff-span-event` (page 57),

This engraver creates the following layout object(s): `StaffSymbol` (page 632).

`Tab_staff_symbol_engraver` (page 452)

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): `StaffSymbol` (page 632).

Time_signature_engraver (page 454)

Create a Section 3.1.147 [TimeSignature], page 657, whenever timeSignatureFraction changes.

Music types accepted: time-signature-event (page 58),

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): TimeSignature (page 657).

2.1.37 TabVoice

Context for drawing notes in a Tab staff.

This context also accepts commands for the following context(s): Voice (page 390).

This context creates the following layout object(s): Arpeggio (page 483), Beam (page 495), BendAfter (page 497), BendSpanner (page 498), BreathingSign (page 502), ClusterSpanner (page 514), ClusterSpannerBeacon (page 515), CombineTextScript (page 517), Dots (page 531), DoublePercentRepeat (page 532), DoublePercentRepeatCounter (page 534), DoubleRepeatSlash (page 535), DynamicLineSpanner (page 538), DynamicText (page 539), DynamicTextSpanner (page 541), FingerGlideSpanner (page 544), Flag (page 548), Glissando (page 552), Hairpin (page 555), InstrumentSwitch (page 560), LaissezVibrerTie (page 569), LaissezVibrerTieColumn (page 570), LigatureBracket (page 573), MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), MultiMeasureRestText (page 591), NoteColumn (page 595), NoteSpacing (page 597), PercentRepeat (page 601), PercentRepeatCounter (page 602), PhrasingSlur (page 604), RepeatSlash (page 608), RepeatTie (page 609), RepeatTieColumn (page 610), Rest (page 611), Script (page 612), ScriptColumn (page 613), Slur (page 621), Stem (page 634), StemStub (page 636), StemTremolo (page 636), TabNoteHead (page 647), TextScript (page 651), TextSpanner (page 653), Tie (page 654), TieColumn (page 656), TrillSpanner (page 662), TupletBracket (page 664), TupletNumber (page 665), and VoiceFollower (page 672).

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):

Arpeggio_engraver (page 403)

Generate an Arpeggio symbol.

Music types accepted: arpeggio-event (page 49),

This engraver creates the following layout object(s): Arpeggio (page 483).

Auto_beam_engraver (page 403)

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 2.2.141 [Stem_engraver], page 450, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 49),

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): Beam (page 495).

Beam_engraver (page 408)

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: beam-event (page 49),

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): Beam (page 495).

Bend_engraver (page 410)

Create fall spanners.

Music types accepted: bend-after-event (page 49),

Properties (read)

currentBarLine (graphical (layout) object)

Set to the BarLine that Bar_engraver has created in the current timestep.

currentCommandColumn (graphical (layout) object)

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

`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): `BendAfter` (page 497).

`Bend_spanner_engraver` (page 410)

Engraver to print a `BendSpanner`.

Music types accepted: `bend-span-event` (page 50), `note-event` (page 54), and `string-number-event` (page 58),

Properties (read)

`stringFretFingerList` (list)
 A list containing three entries. In `TabVoice` and `FretBoards` they determine the string, fret and finger to use

`supportNonIntegerFret` (boolean)
 If set in `Score` the `TabStaff` will print micro-tones as $2\frac{1}{2}$

Properties (write)

`stringFretFingerList` (list)
 A list containing three entries. In `TabVoice` and `FretBoards` they determine the string, fret and finger to use

`supportNonIntegerFret` (boolean)
 If set in `Score` the `TabStaff` will print micro-tones as $2\frac{1}{2}$

This engraver creates the following layout object(s): `BendSpanner` (page 498).

`Breathing_sign_engraver` (page 411)

Notate breath marks.

Music types accepted: `breathing-event` (page 50),

Properties (read)

`breathMarkType` (symbol)
 The type of `BreathingSign` to create at `\breathe`.

This engraver creates the following layout object(s): `BreathingSign` (page 502).

`Chord_tremolo_engraver` (page 413)

Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 59),

This engraver creates the following layout object(s): `Beam` (page 495).

`Cluster_spanner_engraver` (page 414)

Engrave a cluster using `Spanner` notation.

Music types accepted: `cluster-note-event` (page 50),

This engraver creates the following layout object(s): `ClusterSpanner` (page 514), and `ClusterSpannerBeacon` (page 515).

`Dots_engraver` (page 418)

Create Section 3.1.43 [Dots], page 531, objects for Section 3.2.118 [rhythmic-head-interface], page 736s.

This engraver creates the following layout object(s): `Dots` (page 531).

`Double_percent_repeat_engraver` (page 418)

Make double measure repeats.

Music types accepted: double-percent-event (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): DoublePercentRepeat (page 532), and DoublePercentRepeatCounter (page 534).

Dynamic_align_engraver (page 420)

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): DynamicLineSpanner (page 538).

Dynamic_engraver (page 420)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: absolute-dynamic-event (page 48), break-dynamic-span-event (page 50), and span-dynamic-event (page 56),

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): DynamicText (page 539), DynamicTextSpanner (page 541), and Hairpin (page 555).

Finger_glide_engraver (page 422)

Engraver to print a line between two Fingering grobs.

Music types accepted: note-event (page 54),

This engraver creates the following layout object(s): FingerGlideSpanner (page 544).

Font_size_engraver (page 423)

Put `fontSize` into font-size grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

Forbid_line_break_engraver (page 423)

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, except if explicitly requested by the user.

Glissando_engraver (page 424)

Engrave glissandi.

Music types accepted: glissando-event (page 52),

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): Glissando (page 552).

Grace_auto_beam_engraver (page 425)

Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeam, just like setting the context property `'autoBeaming'` to `##f`.

Music types accepted: beam-forbid-event (page 49),

Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s): Beam (page 495).

Grace_beam_engraver (page 425)

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: `beam-event` (page 49),

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): `Beam` (page 495).

`Grace_engraver` (page 425)

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.

`Grob_pq_engraver` (page 426)

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.).

`Instrument_switch_engraver` (page 428)

Create a cue text for taking instrument.

This engraver is deprecated.

Properties (read)

`instrumentCueName` (markup)

The name to print if another instrument is to be taken.

This property is deprecated

This engraver creates the following layout object(s): `InstrumentSwitch` (page 560).

`Laissez_vibrer_engraver` (page 431)

Create `laissez vibrer` items.

Music types accepted: `laissez-vibrer-event` (page 52),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 569), and `LaissezVibrerTieColumn` (page 570).

Ligature_bracket_engraver (page 431)

Handle Ligature_events by engraving Ligature brackets.

Music types accepted: ligature-event (page 52),

This engraver creates the following layout object(s): LigatureBracket (page 573).

Multi_measure_rest_engraver (page 437)

Engrave multi-measure rests that are produced with ‘R’. It reads measureStartNow and internalBarNumber to determine what number to print over the Section 3.1.88 [MultiMeasureRest], page 587.

Music types accepted: multi-measure-articulation-event (page 53),

multi-measure-rest-event (page 53), and multi-measure-text-event (page 53),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

internalBarNumber (integer)

Contains the current barnumber. This property is used for internal time-keeping, among others by the Accidental_engraver.

measureStartNow (boolean)

True at the beginning of a measure.

restNumberThreshold (number)

If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), and MultiMeasureRestText (page 591).

Note_head_line_engraver (page 438)

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): VoiceFollower (page 672).

Note_spacing_engraver (page 439)

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

This engraver creates the following layout object(s): NoteSpacing (page 597).

Output_property_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 49),

Part_combine_engraver (page 441)

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

Music types accepted: note-event (page 54), and part-combine-event (page 55),

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): `CombineTextScript` (page 517).

`Percent_repeat_engraver` (page 441)

Make whole measure repeats.

Music types accepted: `percent-event` (page 55),

Properties (read)

`countPercentRepeats` (boolean)

If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)

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

`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): `PercentRepeat` (page 601), and `PercentRepeatCounter` (page 602).

`Phrasing_slur_engraver` (page 442)

Print phrasing slurs. Similar to Section 2.2.126 [`Slur_engraver`], page 447.

Music types accepted: `note-event` (page 54), and `phrasing-slur-event` (page 55),

This engraver creates the following layout object(s): `PhrasingSlur` (page 604).

`Repeat_tie_engraver` (page 444)

Create repeat ties.

Music types accepted: `repeat-tie-event` (page 55),

This engraver creates the following layout object(s): `RepeatTie` (page 609), and `RepeatTieColumn` (page 610).

`Rest_engraver` (page 444)

Engrave rests.

Music types accepted: `rest-event` (page 55),

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): `Rest` (page 611).

Rhythmic_column_engraver (page 445)

Generate NoteColumn, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): NoteColumn (page 595).

Script_column_engraver (page 445)

Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.

This engraver creates the following layout object(s): ScriptColumn (page 613).

Script_engraver (page 445)

Handle note scripted articulations.

Music types accepted: articulation-event (page 49),

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): Script (page 612).

Slash_repeat_engraver (page 447)

Make beat repeats.

Music types accepted: repeat-slash-event (page 55),

This engraver creates the following layout object(s): DoubleRepeatSlash (page 535), and RepeatSlash (page 608).

Slur_engraver (page 447)

Build slur grobs from slur events.

Music types accepted: note-event (page 54), and slur-event (page 56),

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): Slur (page 621).

Spanner_break_forbid_engraver (page 448)

Forbid breaks in certain spanners.

Stem_engraver (page 450)

Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: tremolo-event (page 58), and tuplet-span-event (page 59),

Properties (read)

currentBarLine (graphical (layout) object)

Set to the BarLine that Bar_engraver has created in the current timestep.

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`.

This engraver creates the following layout object(s): `Flag` (page 548), `Stem` (page 634), `StemStub` (page 636), and `StemTremolo` (page 636).

`Tab_note_heads_engraver` (page 451)

Generate one or more tablature note heads from event of type `NoteEvent`.

Music types accepted: `fingering-event` (page 51), `note-event` (page 54), and `string-number-event` (page 58),

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 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): `TabNoteHead` (page 647).

`Tab_tie_follow_engraver` (page 452)

Adjust `TabNoteHead` properties when a tie is followed by a slur or glissando.

Text_engraver (page 452)

Create text scripts.

Music types accepted: text-script-event (page 58),

This engraver creates the following layout object(s): TextScript (page 651).

Text_spanner_engraver (page 453)

Create text spanner from an event.

Music types accepted: text-span-event (page 58),

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): TextSpanner (page 653).

Tie_engraver (page 453)

Generate ties between note heads of equal pitch.

Music types accepted: tie-event (page 58),

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): Tie (page 654), and

TieColumn (page 656).

Trill_spanner_engraver (page 455)

Create trill spanners.

Music types accepted: trill-span-event (page 59),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): TrillSpanner (page 662).

Tuplet_engraver (page 456)

Catch tuplet events and generate appropriate bracket.

Music types accepted: tuplet-span-event (page 59),

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): `TupletBracket` (page 664), and `TupletNumber` (page 665).

2.1.38 VaticanaLyrics

Same as `Lyrics` context, except that it provides a hyphenation style (a single, flush-left hyphen between two syllables) as used in the notational style of *Editio Vaticana*.

This context also accepts commands for the following context(s): `Lyrics` (page 199).

This context creates the following layout object(s): `InstrumentName` (page 559), `LyricExtender` (page 574), `LyricHyphen` (page 575), `LyricSpace` (page 578), `LyricText` (page 578), `StanzaNumber` (page 633), `VerticalAxisGroup` (page 670), and `VowelTransition` (page 675).

This context sets the following properties:

- Set context property `instrumentName` to `'()`.
- Set context property `lyricRepeatCountFormatter` to `#<procedure 7f33949758e0 at ice-9/eval.scm:336:13 (a b)>`.
- Set context property `searchForVoice` to `#f`.
- Set context property `shortInstrumentName` to `'()`.
- Set grob property `bar-extent` in `BarLine` (page 486), to :
`'(-0.05 . 0.05)`
- Set grob property `font-series` in `LyricHyphen` (page 575), to `'medium`.
- Set grob property `font-size` in `InstrumentName` (page 559), to `1.0`.
- Set grob property `font-size` in `LyricHyphen` (page 575), to `-4`.
- Set grob property `font-size` in `LyricText` (page 578), to `-4`.
- Set grob property `nonstaff-nonstaff-spacing` in `VerticalAxisGroup` (page 670), to :
`'((basic-distance . 0)
 (minimum-distance . 2.8)
 (padding . 0.2)
 (stretchability . 0))`
- Set grob property `nonstaff-relatedstaff-spacing` in `VerticalAxisGroup` (page 670), to :
`'((basic-distance . 5.5)
 (padding . 0.5)
 (stretchability . 1))`
- Set grob property `nonstaff-unrelatedstaff-spacing.padding` in `VerticalAxisGroup` (page 670), to `1.5`.
- Set grob property `remove-empty` in `VerticalAxisGroup` (page 670), to `#t`.
- Set grob property `remove-first` in `VerticalAxisGroup` (page 670), to `#t`.
- Set grob property `self-alignment-Y` in `InstrumentName` (page 559), to `#f`.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 670), to `1`.
- Set grob property `stencil` in `LyricHyphen` (page 575), to `lyric-hyphen::vaticana-style`.

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):

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Extender_engraver` (page 421)

Create lyric extenders.

Music types accepted: `completize-extender-event` (page 50), and `extender-event` (page 51),

Properties (read)

`extendersOverRests` (boolean)

Whether to continue extenders as they cross a rest.

This engraver creates the following layout object(s): `LyricExtender` (page 574).

`Font_size_engraver` (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

`Hyphen_engraver` (page 427)

Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted: `hyphen-event` (page 52), and `vowel-transition-event` (page 59),

This engraver creates the following layout object(s): `LyricHyphen` (page 575), `LyricSpace` (page 578), and `VowelTransition` (page 675).

`Instrument_name_engraver` (page 427)

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 items (clef, key signature, etc.).

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): InstrumentName (page 559).

Lyric_engraver (page 431)

Engrave text for lyrics.

Music types accepted: lyric-event (page 53),

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): LyricText (page 578).

Pure_from_neighbor_engraver (page 443)

Coordinates items that get their pure heights from their neighbors.

Stanza_number_engraver (page 450)

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): StanzaNumber (page 633).

2.1.39 VaticanaStaff

Configure division commands such as \section to create Divisio grobs rather than BarLine grobs. This does not affect measure bar lines or the properties of the grobs themselves.

This context also accepts commands for the following context(s): Staff (page 287).

This context creates the following layout object(s): Accidental (page 475), AccidentalCautionary (page 476), AccidentalPlacement (page 477), AccidentalSuggestion (page 478), BarLine (page 486), BassFigure (page 491), BassFigureAlignment (page 492), BassFigureAlignmentPositioning (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), BassFigureLine (page 494), Clef (page 510), ClefModifier (page 513), CueClef (page 521), CueEndClef (page 524), Custos (page 527), Divisio (page 528), DotColumn (page 531), FingeringColumn (page 547), InstrumentName (page 559), KeyCancellation (page 563), KeySignature

(page 566), LedgerLineSpanner (page 570), NoteCollision (page 594), OttavaBracket (page 598), PianoPedalBracket (page 605), RestCollision (page 612), ScriptColumn (page 613), ScriptRow (page 614), SostenuotoPedal (page 623), SostenuotoPedalLineSpanner (page 624), StaffEllipsis (page 628), StaffHighlight (page 631), StaffSpacing (page 632), StaffSymbol (page 632), SustainPedal (page 640), SustainPedalLineSpanner (page 641), UnaCordaPedal (page 666), UnaCordaPedalLineSpanner (page 667), and VerticalAxisGroup (page 670).

This context sets the following properties:

- Set context property alterationGlyphs to:
`'((-1/2 . "accidentals.vaticanaM1")
(0 . "accidentals.vaticana0")
(1/2 . "accidentals.mensural1"))'`
- Set context property autoAccidentals to:
`'(Staff #<procedure 7f3394949b80 at ice-9/eval.scm:339:13 (a b c)>)`
- Set context property autoCautionaries to `'()`.
- Set context property caesuraTypeTransform to `caesura-to-bar-line-or-divisio`.
- Set context property caesuraTypeTransform to `caesura-to-divisio`.
- Set context property caesuraType to:
`'((breath . varcomma))'`
- Set context property clefGlyph to `"clefs.vaticana.do"`.
- Set context property clefPosition to 1.
- Set context property clefTransposition to 0.
- Set context property createSpacing to `#t`.
- Set context property doubleRepeatBarType to `"||"`.
- Set context property doubleRepeatBarType to `'()`.
- Set context property doubleRepeatSegnoBarType to `"S-||"`.
- Set context property doubleRepeatSegnoBarType to `"S-||"`.
- Set context property endRepeatBarType to `"||"`.
- Set context property endRepeatBarType to `'()`.
- Set context property endRepeatSegnoBarType to `"S-||"`.
- Set context property endRepeatSegnoBarType to `"S-||"`.
- Set context property extraNatural to `#f`.
- Set context property fineBarType to `""`.
- Set context property fineBarType to `"||"`.
- Set context property fineSegnoBarType to `"S-||"`.
- Set context property fineSegnoBarType to `"S-||"`.
- Set context property fineStartRepeatSegnoBarType to `"S-||"`.
- Set context property fineStartRepeatSegnoBarType to `"S-||"`.
- Set context property forbidBreakBetweenBarLines to `#f`.
- Set context property ignoreFiguredBassRest to `#f`.
- Set context property instrumentName to `'()`.
- Set context property localAlterations to `'()`.
- Set context property measureBarType to `'()`.
- Set context property middleCClefPosition to 1.

- Set context property middleCPosition to 1.
- Set context property ottavationMarkups to:


```
'((4 . "29")
  (3 . "22")
  (2 . "15")
  (1 . "8")
  (-1 . "8")
  (-2 . "15")
  (-3 . "22")
  (-4 . "29"))
```
- Set context property printKeyCancellation to #f.
- Set context property sectionBarType to "".
- Set context property sectionBarType to "||".
- Set context property segnoBarType to "S-||".
- Set context property segnoBarType to "S-||".
- Set context property shortInstrumentName to '().
- Set context property startRepeatBarType to "||".
- Set context property startRepeatBarType to '().
- Set context property startRepeatSegnoBarType to "S-||".
- Set context property startRepeatSegnoBarType to "S-||".
- Set context property underlyingRepeatBarType to "".
- Set context property underlyingRepeatBarType to "||".
- Set grob property extra-spacing-height in BreathingSign (page 502), to item::extra-spacing-height-including-staff.
- Set grob property extra-spacing-width in BreathingSign (page 502), to :


```
'(-1.0 . 0.0)
```
- Set grob property font-size in BreathingSign (page 502), to -2.
- Set grob property font-size in Divisio (page 528), to -2.
- Set grob property hair-thickness in BarLine (page 486), to 0.6.
- Set grob property ledger-line-thickness in StaffSymbol (page 632), to :


```
'(1 . 0)
```
- Set grob property length-fraction in LedgerLineSpanner (page 570), to 0.9.
- Set grob property line-count in StaffSymbol (page 632), to 4.
- Set grob property neutral-direction in Custos (page 527), to -1.
- Set grob property neutral-position in Custos (page 527), to 3.
- Set grob property space-alist.clef in LeftEdge (page 571), to :


```
'(extra-space . 0)
```
- Set grob property space-alist.custos in BarLine (page 486), to :


```
'(minimum-space . 0.7)
```
- Set grob property space-alist.first-note in Clef (page 510), to :


```
'(minimum-fixed-space . 1.4)
```
- Set grob property space-alist.right-edge in Custos (page 527), to :


```
'(extra-space . 0)
```
- Set grob property style in Custos (page 527), to 'vaticana.

- Set grob property style in Dots (page 531), to 'vaticana.
- Set grob property thick-thickness in BarLine (page 486), to 1.8.
- Set grob property thickness in BreathingSign (page 502), to 1.
- Set grob property thickness in Divisio (page 528), to 1.
- Set grob property thickness in StaffSymbol (page 632), to 0.6.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type VaticanaVoice (page 380).

Context VaticanaStaff can contain CueVoice (page 98), NullVoice (page 228), and VaticanaVoice (page 380).

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

Accidental_engraver (page 401)

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.

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 time-keeping, 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): `Accidental` (page 475), `AccidentalCautionary` (page 476), `AccidentalPlacement` (page 477), and `AccidentalSuggestion` (page 478).

`Alteration_glyph_engraver` (page 402)

Set the `glyph-name-alist` of all grobs having the `accidental-switch-interface` to the value of the context's `alterationGlyphs` property, when defined.

Properties (read)

`alterationGlyphs` (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., $-1/2$ for flat. This applies to all grobs that can print accidentals.

`Axis_group_engraver` (page 404)

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 items (clef, key signature, etc.).

`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): `VerticalAxisGroup` (page 670).

`Bar_engraver` (page 404)

Create bar lines for various commands, including `\bar`.

If `forbidBreakBetweenBarLines` is true, allow line breaks at bar lines only.

Music types accepted: `ad-hoc-jump-event` (page 48), `caesura-event` (page 50), `coda-mark-event` (page 50), `dal-segno-event` (page 51), `fine-event` (page 51), `section-event` (page 56), `segno-mark-event` (page 56), and `volta-span-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

`((bar-line . bar-type)`

`(breath . breath-type)`

`(scripts . script-type...)`

`(underlying-bar-line . bar-type))`

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...'`.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|.'`.

`endRepeatBarType` (string)

Bar line to insert at the end of a `\repeat volta`. The default is `':|..'`.

`endRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S.'`.

`fineBarType` (string)
 Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'|. '`.

`fineSegnoBarType` (string)
 Bar line to insert where an in-staff segno coincides with `\fine`. The default is `'|.S'`.

`fineStartRepeatSegnoBarType` (string)
 Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `'|.S.|: '`.

`forbidBreakBetweenBarLines` (boolean)
 If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)
 Bar line to insert at a measure boundary.

`repeatCommands` (list)
 A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`
 End a repeated section.

`start-repeat`
 Start a repeated section.

`volta text`
 If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`sectionBarType` (string)
 Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`segnoBarType` (string)
 Bar line to insert at an in-staff segno. The default is `'S'`.

`segnoStyle` (symbol)
 A symbol that indicates how to print a segno: `bar-line` or `mark`.

`startRepeatBarType` (string)
 Bar line to insert at the start of a `\repeat volta`. The default is `'.|: '`.

`startRepeatSegnoBarType` (string)
 Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is `'S.|: '`.

`underlyingRepeatBarType` (string)
 Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`whichBar` (string)

The current bar line type, or '()' if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

Properties (write)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): `BarLine` (page 486).

`Clef_engraver` (page 413)

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.

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to `#t` when an event forcing a line break was heard.

`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): `Clef` (page 510), and `ClefModifier` (page 513).

`Collision_engraver` (page 414)

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): `NoteCollision` (page 594).

`Cue_clef_engraver` (page 416)

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.
- `forbidBreak` (boolean)
If set to #t, prevent a line break at this point, except if explicitly requested by the user.
- `forceBreak` (boolean)
Set to #t when an event forcing a line break was heard.
- `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): `ClefModifier` (page 513), `CueClef` (page 521), and `CueEndClef` (page 524).

`Custos_engraver` (page 417)

Engrave custodes.

Properties (read)

- `forbidBreak` (boolean)
If set to #t, prevent a line break at this point, except if explicitly requested by the user.
- `forceBreak` (boolean)
Set to #t when an event forcing a line break was heard.

This engraver creates the following layout object(s): `Custos` (page 527).

`Divisio_engraver` (page 417)

Create divisiones: chant notation for points of breathing or caesura.

Music types accepted: `caesura-event` (page 50), `fine-event` (page 51), `section-event` (page 56), `volta-repeat-end-event` (page 59), and `volta-repeat-start-event` (page 59),

Properties (read)

- `caesuraType` (list)
An alist
(`(bar-line . bar-type)`)

```
(breath . breath-type)
(scripts . script-type...)
(underlying-bar-line . bar-type)
```

specifying which breath mark, bar line, and scripts to create at \caesura. All entries are optional.

bar-line has higher priority than a measure bar line and underlying-bar-line has lower priority than a measure bar line.

caesuraTypeTransform (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as caesuraType.

The first argument is the context.

The second argument is the value of caesuraType with an additional entry (*articulations . symbol-list*) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. bar-line indicates that the engraver has observed a BarLine at the current moment.

This engraver creates the following layout object(s): Divisio (page 528).

Dot_column_engraver (page 418)

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): DotColumn (page 531).

Figured_bass_engraver (page 421)

Make figured bass numbers.

Music types accepted: bass-figure-event (page 49), and rest-event (page 55),
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): BassFigure (page 491), BassFigureAlignment (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), and BassFigureLine (page 494).

Figured_bass_position_engraver (page 422)

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

BassFigureAlignmentPositioning (page 492).

Fingering_column_engraver (page 422)

Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.

This engraver creates the following layout object(s): FingeringColumn (page 547).

Font_size_engraver (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

Grob_pq_engraver (page 426)

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.).

Instrument_name_engraver (page 427)

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 items (clef, key signature, etc.).

`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): `InstrumentName` (page 559).

Key_engraver (page 429)

Engrave a key signature.

Music types accepted: key-change-event (page 52),

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.

forbidBreak (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

forceBreak (boolean)

Set to #t when an event forcing a line break was heard.

keyAlterationOrder (list)

A list of pairs that defines in what order alterations should be printed. The format of an entry is (*step* . *alter*), where *step* is a number from 0 to 6 and *alter* from -1 (double flat) to 1 (double sharp), with exact rationals for alterations in between, e.g., 1/2 for sharp.

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): KeyCancellation (page 563), and KeySignature (page 566).

Ledger_line_engraver (page 431)

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): **LedgerLineSpanner** (page 570).

Merge_mmrest_numbers_engraver (page 435)

Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

Non_musical_script_column_engraver (page 438)

Find potentially colliding non-musical scripts and put them into a **ScriptColumn** object; that will fix the collisions.

This engraver creates the following layout object(s): **ScriptColumn** (page 613).

Ottava_spanner_engraver (page 439)

Create a text spanner when the ottavation property changes.

Music types accepted: **ottava-event** (page 54),

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): **OttavaBracket** (page 598).

Output_property_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: **apply-output-event** (page 49),

Piano_pedal_align_engraver (page 442)

Align piano pedal symbols and brackets.

Properties (read)

currentCommandColumn (graphical (layout) object)

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

This engraver creates the following layout object(s): **SostenutoPedalLineSpanner** (page 624), **SustainPedalLineSpanner** (page 641), and **UnaCordaPedalLineSpanner** (page 667).

Piano_pedal_engraver (page 442)

Engrave piano pedal symbols and brackets.

Music types accepted: **sostenuto-event** (page 56), **sustain-event** (page 58), and **una-corda-event** (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `PianoPedalBracket` (page 605), `SostenutoPedal` (page 623), `SustainPedal` (page 640), and `UnaCordaPedal` (page 666).

`Pure_from_neighbor_engraver` (page 443)

Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 444)

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): `RestCollision` (page 612).

`Script_row_engraver` (page 445)

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 614).

`Separating_line_group_engraver` (page 446)

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)

Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)

True if `currentCommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 632).

`Skip_typesetting_engraver` (page 446)

Create a `StaffEllipsis` when `skipTypesetting` is used.

Properties (read)

`skipTypesetting` (boolean)

If true, no typesetting is done, speeding up the interpretation phase.

Useful for debugging large scores.

This engraver creates the following layout object(s): `StaffEllipsis` (page 628).

`Staff_collecting_engraver` (page 448)

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_highlight_engraver` (page 449)

Highlights music passages.

Music types accepted: `staff-highlight-event` (page 57),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `StaffHighlight` (page 631).

`Staff_symbol_engraver` (page 449)

Create the constellation of five (default) staff lines.

Music types accepted: `staff-span-event` (page 57),

This engraver creates the following layout object(s): `StaffSymbol` (page 632).

2.1.40 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` (page 390).

This context creates the following layout object(s): `Arpeggio` (page 483), `Beam` (page 495), `BendAfter` (page 497), `BreathingSign` (page 502), `ClusterSpanner` (page 514), `ClusterSpannerBeacon` (page 515), `CombineTextScript` (page 517), `DotColumn` (page 531), `Dots` (page 531), `DoublePercentRepeat` (page 532), `DoublePercentRepeatCounter` (page 534), `DoubleRepeatSlash` (page 535), `DynamicLineSpanner` (page 538), `DynamicText` (page 539), `DynamicTextSpanner` (page 541), `Episema` (page 543), `FingerGlideSpanner` (page 544), `Fingering` (page 545), `Glissando` (page 552), `Hairpin` (page 555), `InstrumentSwitch` (page 560), `LaissezVibrerTie` (page 569), `LaissezVibrerTieColumn` (page 570), `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), `MultiMeasureRestText` (page 591), `NoteColumn` (page 595), `NoteHead` (page 596), `NoteSpacing` (page 597), `PercentRepeat` (page 601), `PercentRepeatCounter` (page 602), `PhrasingSlur` (page 604), `RepeatSlash` (page 608),

RepeatTie (page 609), RepeatTieColumn (page 610), Rest (page 611), Script (page 612), ScriptColumn (page 613), StringNumber (page 637), StrokeFinger (page 639), TextScript (page 651), Tie (page 654), TieColumn (page 656), TrillPitchAccidental (page 659), TrillPitchGroup (page 660), TrillPitchHead (page 661), TrillPitchParentheses (page 662), TrillSpanner (page 662), TupletBracket (page 664), TupletNumber (page 665), VaticanaLigature (page 669), and VoiceFollower (page 672).

This context sets the following properties:

- Set context property `autoBeaming` to `#f`.
- Set grob property `bound-details.left.padding` in `Episema` (page 543), to 0.05.
- Set grob property `bound-details.right.padding` in `Episema` (page 543), to 0.05.
- Set grob property `style` in `NoteHead` (page 596), to `'vaticana.punctum`.
- Set grob property `thickness` in `Episema` (page 543), to 1.6.

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):

Arpeggio_engraver (page 403)

Generate an Arpeggio symbol.

Music types accepted: `arpeggio-event` (page 49),

This engraver creates the following layout object(s): `Arpeggio` (page 483).

Auto_beam_engraver (page 403)

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 2.2.141 [`Stem_engraver`], page 450, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted: `beam-forbid-event` (page 49),

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): `Beam` (page 495).

Beam_engraver (page 408)

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: beam-event (page 49),

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): Beam (page 495).

Bend_engraver (page 410)

Create fall spanners.

Music types accepted: bend-after-event (page 49),

Properties (read)

currentBarLine (graphical (layout) object)

Set to the BarLine that Bar_engraver has created in the current timestep.

currentCommandColumn (graphical (layout) object)

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

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): BendAfter (page 497).

Breathing_sign_engraver (page 411)

Notate breath marks.

Music types accepted: breathing-event (page 50),

Properties (read)

breathMarkType (symbol)

The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 502).

Chord_tremolo_engraver (page 413)

Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 59),

This engraver creates the following layout object(s): Beam (page 495).

Cluster_spanner_engraver (page 414)

Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 50),

This engraver creates the following layout object(s): ClusterSpanner (page 514), and ClusterSpannerBeacon (page 515).

Dots_engraver (page 418)

Create Section 3.1.43 [Dots], page 531, objects for Section 3.2.118 [rhythmic-head-interface], page 736s.

This engraver creates the following layout object(s): Dots (page 531).

Double_percent_repeat_engraver (page 418)

Make double measure repeats.

Music types accepted: double-percent-event (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): DoublePercentRepeat (page 532), and DoublePercentRepeatCounter (page 534).

Dynamic_align_engraver (page 420)

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): DynamicLineSpanner (page 538).

Dynamic_engraver (page 420)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: absolute-dynamic-event (page 48), break-dynamic-span-event (page 50), and span-dynamic-event (page 56),

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): DynamicText (page 539), DynamicTextSpanner (page 541), and Hairpin (page 555).

Episema_engraver (page 421)

Create an *Editio Vaticana*-style episema line.

Music types accepted: episema-event (page 51),

This engraver creates the following layout object(s): Episema (page 543).

Finger_glide_engraver (page 422)

Engraver to print a line between two Fingering grobs.

Music types accepted: note-event (page 54),

This engraver creates the following layout object(s): FingerGlideSpanner (page 544).

Fingering_engraver (page 423)

Create fingering scripts.

Music types accepted: fingering-event (page 51),

This engraver creates the following layout object(s): Fingering (page 545).

Font_size_engraver (page 423)

Put fontSize into font-size grob property.

Properties (read)

fontSize (number)

The relative size of all grobs in a context.

Forbid_line_break_engraver (page 423)

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, except if explicitly requested by the user.

Glissando_engraver (page 424)

Engrave glissandi.

Music types accepted: glissando-event (page 52),

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): Glissando (page 552).

Grace_auto_beam_engraver (page 425)

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: beam-forbid-event (page 49),

Properties (read)

autoBeaming (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s): Beam (page 495).

Grace_beam_engraver (page 425)

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: beam-event (page 49),

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): Beam (page 495).

Grace_engraver (page 425)

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.

Grob_pq_engraver (page 426)

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.).

Instrument_switch_engraver (page 428)

Create a cue text for taking instrument.

This engraver is deprecated.

Properties (read)

instrumentCueName (markup)

The name to print if another instrument is to be taken.

This property is deprecated

This engraver creates the following layout object(s): InstrumentSwitch (page 560).

Laissez_vibrer_engraver (page 431)

Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 52),

This engraver creates the following layout object(s): LaissezVibrerTie (page 569), and LaissezVibrerTieColumn (page 570).

Multi_measure_rest_engraver (page 437)

Engrave multi-measure rests that are produced with ‘R’. It reads measureStartNow and internalBarNumber to determine what number to print over the Section 3.1.88 [MultiMeasureRest], page 587.

Music types accepted: multi-measure-articulation-event (page 53), multi-measure-rest-event (page 53), and multi-measure-text-event (page 53),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

internalBarNumber (integer)

Contains the current barnumber. This property is used for internal time-keeping, among others by the Accidental_engraver.

measureStartNow (boolean)

True at the beginning of a measure.

restNumberThreshold (number)

If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), and MultiMeasureRestText (page 591).

New_fingering_engraver (page 437)

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): Fingering (page 545), Script (page 612), StringNumber (page 637), and StrokeFinger (page 639).

Note_head_line_engraver (page 438)

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): VoiceFollower (page 672).

Note_heads_engraver (page 438)

Generate note heads.

Music types accepted: note-event (page 54),

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): NoteHead (page 596).

Note_spacing_engraver (page 439)

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

This engraver creates the following layout object(s): NoteSpacing (page 597).

Output_property_engraver (page 439)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 49),

Part_combine_engraver (page 441)

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

Music types accepted: note-event (page 54), and part-combine-event (page 55),

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): `CombineTextScript` (page 517).

`Percent_repeat_engraver` (page 441)

Make whole measure repeats.

Music types accepted: `percent-event` (page 55),

Properties (read)

`countPercentRepeats` (boolean)

If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)

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

`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): `PercentRepeat` (page 601), and `PercentRepeatCounter` (page 602).

`Phrasing_slur_engraver` (page 442)

Print phrasing slurs. Similar to Section 2.2.126 [`Slur_engraver`], page 447.

Music types accepted: `note-event` (page 54), and `phrasing-slur-event` (page 55),

This engraver creates the following layout object(s): `PhrasingSlur` (page 604).

`Pitched_trill_engraver` (page 443)

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 659), `TrillPitchGroup` (page 660), `TrillPitchHead` (page 661), and `TrillPitchParentheses` (page 662).

`Repeat_tie_engraver` (page 444)

Create repeat ties.

Music types accepted: `repeat-tie-event` (page 55),

This engraver creates the following layout object(s): `RepeatTie` (page 609), and `RepeatTieColumn` (page 610).

`Rest_engraver` (page 444)

Engrave rests.

Music types accepted: `rest-event` (page 55),

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): `Rest` (page 611).

`Rhythmic_column_engraver` (page 445)

Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 595).

Script_column_engraver (page 445)

Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 613).

Script_engraver (page 445)

Handle note scripted articulations.

Music types accepted: `articulation-event` (page 49),

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): `Script` (page 612).

Slash_repeat_engraver (page 447)

Make beat repeats.

Music types accepted: `repeat-slash-event` (page 55),

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 535), and `RepeatSlash` (page 608).

Spanner_break_forbid_engraver (page 448)

Forbid breaks in certain spanners.

Text_engraver (page 452)

Create text scripts.

Music types accepted: `text-script-event` (page 58),

This engraver creates the following layout object(s): `TextScript` (page 651).

Tie_engraver (page 453)

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 58),

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): `Tie` (page 654), and `TieColumn` (page 656).

Trill_spanner_engraver (page 455)

Create trill spanners.

Music types accepted: `trill-span-event` (page 59),

Properties (read)

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

`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): `TrillSpanner` (page 662).

`Tuplet_engraver` (page 456)

Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 59),

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): `TupletBracket` (page 664), and `TupletNumber` (page 665).

`Vaticana_ligature_engraver` (page 456)

Handle ligatures by glueing special ligature heads together.

Music types accepted: `ligature-event` (page 52), and `pes-or-flexa-event` (page 55),

This engraver creates the following layout object(s): `DotColumn` (page 531), and `VaticanaLigature` (page 669).

2.1.41 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): `Arpeggio` (page 483), `Beam` (page 495), `BendAfter` (page 497), `BreathingSign` (page 502), `ClusterSpanner` (page 514), `ClusterSpannerBeacon` (page 515), `CombineTextScript` (page 517), `Dots` (page 531), `DoublePercentRepeat` (page 532), `DoublePercentRepeatCounter` (page 534), `DoubleRepeatSlash` (page 535), `DynamicLineSpanner` (page 538), `DynamicText` (page 539), `DynamicTextSpanner` (page 541), `FingerGlideSpanner` (page 544), `Fingering` (page 545), `Flag` (page 548), `Glissando` (page 552), `Hairpin` (page 555), `InstrumentSwitch` (page 560), `LaissezVibrerTie` (page 569), `LaissezVibrerTieColumn` (page 570), `LigatureBracket` (page 573), `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), `MultiMeasureRestText` (page 591), `NoteColumn` (page 595), `NoteHead` (page 596), `NoteSpacing` (page 597), `PercentRepeat` (page 601), `PercentRepeatCounter` (page 602), `PhrasingSlur` (page 604), `RepeatSlash` (page 608), `RepeatTie` (page 609), `RepeatTieColumn` (page 610), `Rest` (page 611), `Script` (page 612), `ScriptColumn` (page 613), `Slur` (page 621), `Stem` (page 634), `StemStub` (page 636), `StemTremolo` (page 636), `StringNumber` (page 637), `StrokeFinger` (page 639), `TextScript` (page 651), `TextSpanner` (page 653), `Tie` (page 654), `TieColumn` (page 656), `TrillPitchAccidental` (page 659), `TrillPitchGroup` (page 660), `TrillPitchHead`

(page 661), TrillPitchParentheses (page 662), TrillSpanner (page 662), TupletBracket (page 664), TupletNumber (page 665), and VoiceFollower (page 672).

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):

Arpeggio_engraver (page 403)

Generate an Arpeggio symbol.

Music types accepted: arpeggio-event (page 49),

This engraver creates the following layout object(s): Arpeggio (page 483).

Auto_beam_engraver (page 403)

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 2.2.141 [Stem_engraver], page 450, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 49),

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): Beam (page 495).

Beam_engraver (page 408)

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: beam-event (page 49),

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): Beam (page 495).

Bend_engraver (page 410)

Create fall spanners.

Music types accepted: bend-after-event (page 49),

Properties (read)

currentBarLine (graphical (layout) object)

Set to the BarLine that Bar_engraver has created in the current timestep.

currentCommandColumn (graphical (layout) object)

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

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): BendAfter (page 497).

Breathing_sign_engraver (page 411)

Notate breath marks.

Music types accepted: breathing-event (page 50),

Properties (read)

breathMarkType (symbol)

The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 502).

Chord_tremolo_engraver (page 413)

Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 59),

This engraver creates the following layout object(s): Beam (page 495).

Cluster_spanner_engraver (page 414)

Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 50),

This engraver creates the following layout object(s): ClusterSpanner (page 514), and ClusterSpannerBeacon (page 515).

Dots_engraver (page 418)

Create Section 3.1.43 [Dots], page 531, objects for Section 3.2.118 [rhythmic-head-interface], page 736s.

This engraver creates the following layout object(s): Dots (page 531).

Double_percent_repeat_engraver (page 418)

Make double measure repeats.

Music types accepted: double-percent-event (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): `DoublePercentRepeat` (page 532), and `DoublePercentRepeatCounter` (page 534).

`Dynamic_align_engraver` (page 420)

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): `DynamicLineSpanner` (page 538).

`Dynamic_engraver` (page 420)

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 48), `break-dynamic-span-event` (page 50), and `span-dynamic-event` (page 56),

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): `DynamicText` (page 539), `DynamicTextSpanner` (page 541), and `Hairpin` (page 555).

`Finger_glide_engraver` (page 422)

Engraver to print a line between two Fingering grobs.

Music types accepted: `note-event` (page 54),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 544).

Fingering_engraver (page 423)

Create fingering scripts.

Music types accepted: `fingering-event` (page 51),

This engraver creates the following layout object(s): `Fingering` (page 545).

Font_size_engraver (page 423)

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)

The relative size of all grobs in a context.

Forbid_line_break_engraver (page 423)

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, except if explicitly requested by the user.

Glissando_engraver (page 424)

Engrave glissandi.

Music types accepted: `glissando-event` (page 52),

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): `Glissando` (page 552).

Grace_auto_beam_engraver (page 425)

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: `beam-forbid-event` (page 49),

Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s): `Beam` (page 495).

Grace_beam_engraver (page 425)

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: `beam-event` (page 49),

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): `Beam` (page 495).

`Grace_engraver` (page 425)

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.

`Grob_pq_engraver` (page 426)

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.).

`Instrument_switch_engraver` (page 428)

Create a cue text for taking instrument.

This engraver is deprecated.

Properties (read)

`instrumentCueName` (markup)

The name to print if another instrument is to be taken.

This property is deprecated

This engraver creates the following layout object(s): `InstrumentSwitch` (page 560).

`Laissez_vibrer_engraver` (page 431)

Create *laissez vibrer* items.

Music types accepted: `laissez-vibrer-event` (page 52),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 569), and `LaissezVibrerTieColumn` (page 570).

Ligature_bracket_engraver (page 431)

Handle Ligature_events by engraving Ligature brackets.

Music types accepted: ligature-event (page 52),

This engraver creates the following layout object(s): LigatureBracket (page 573).

Multi_measure_rest_engraver (page 437)

Engrave multi-measure rests that are produced with ‘R’. It reads measureStartNow and internalBarNumber to determine what number to print over the Section 3.1.88 [MultiMeasureRest], page 587.

Music types accepted: multi-measure-articulation-event (page 53),

multi-measure-rest-event (page 53), and multi-measure-text-event (page 53),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

internalBarNumber (integer)

Contains the current barnumber. This property is used for internal time-keeping, among others by the Accidental_engraver.

measureStartNow (boolean)

True at the beginning of a measure.

restNumberThreshold (number)

If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), and MultiMeasureRestText (page 591).

New_fingering_engraver (page 437)

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): Fingering (page 545), Script (page 612), StringNumber (page 637), and StrokeFinger (page 639).

Note_head_line_engraver (page 438)

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): `VoiceFollower` (page 672).

`Note_heads_engraver` (page 438)
 Generate note heads.
 Music types accepted: `note-event` (page 54),
 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): `NoteHead` (page 596).

`Note_spacing_engraver` (page 439)
 Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.
 This engraver creates the following layout object(s): `NoteSpacing` (page 597).

`Output_property_engraver` (page 439)
 Apply a procedure to any grob acknowledged.
 Music types accepted: `apply-output-event` (page 49),

`Part_combine_engraver` (page 441)
 Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
 Music types accepted: `note-event` (page 54), and `part-combine-event` (page 55),
 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): `CombineTextScript` (page 517).

`Percent_repeat_engraver` (page 441)
 Make whole measure repeats.
 Music types accepted: `percent-event` (page 55),
 Properties (read)

- `countPercentRepeats` (boolean)
 If set, produce counters for percent repeats.
- `currentCommandColumn` (graphical (layout) object)
 Grob that is X-parent to all current breakable items (clef, key signature, etc.).

`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): `PercentRepeat` (page 601), and `PercentRepeatCounter` (page 602).

`Phrasing_slur_engraver` (page 442)

Print phrasing slurs. Similar to Section 2.2.126 [`Slur_engraver`], page 447.

Music types accepted: `note-event` (page 54), and `phrasing-slur-event` (page 55),

This engraver creates the following layout object(s): `PhrasingSlur` (page 604).

`Pitched_trill_engraver` (page 443)

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 659), `TrillPitchGroup` (page 660), `TrillPitchHead` (page 661), and `TrillPitchParentheses` (page 662).

`Repeat_tie_engraver` (page 444)

Create repeat ties.

Music types accepted: `repeat-tie-event` (page 55),

This engraver creates the following layout object(s): `RepeatTie` (page 609), and `RepeatTieColumn` (page 610).

`Rest_engraver` (page 444)

Engrave rests.

Music types accepted: `rest-event` (page 55),

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): `Rest` (page 611).

`Rhythmic_column_engraver` (page 445)

Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 595).

`Script_column_engraver` (page 445)

Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s): `ScriptColumn` (page 613).

`Script_engraver` (page 445)

Handle note scripted articulations.

Music types accepted: `articulation-event` (page 49),

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): `Script` (page 612).
- `Slash_repeat_engraver` (page 447)
 Make beat repeats.
 Music types accepted: `repeat-slash-event` (page 55),
 This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 535), and `RepeatSlash` (page 608).
- `Slur_engraver` (page 447)
 Build slur grobs from slur events.
 Music types accepted: `note-event` (page 54), and `slur-event` (page 56),
 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): `Slur` (page 621).
- `Spanner_break_forbid_engraver` (page 448)
 Forbid breaks in certain spanners.
- `Stem_engraver` (page 450)
 Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.
 Music types accepted: `tremolo-event` (page 58), and `tuplet-span-event` (page 59),
 Properties (read)
 `currentBarLine` (graphical (layout) object)
 Set to the `BarLine` that `Bar_engraver` has created in the current timestep.
 `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`.
- This engraver creates the following layout object(s): `Flag` (page 548), `Stem` (page 634), `StemStub` (page 636), and `StemTremolo` (page 636).
- `Text_engraver` (page 452)
 Create text scripts.
 Music types accepted: `text-script-event` (page 58),
 This engraver creates the following layout object(s): `TextScript` (page 651).
- `Text_spanner_engraver` (page 453)
 Create text spanner from an event.
 Music types accepted: `text-span-event` (page 58),
 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): `TextSpanner` (page 653).

`Tie_engraver` (page 453)

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 58),

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): `Tie` (page 654), and `TieColumn` (page 656).

`Trill_spanner_engraver` (page 455)

Create trill spanners.

Music types accepted: `trill-span-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `TrillSpanner` (page 662).

`Tuplet_engraver` (page 456)

Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 59),

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): `TupletBracket` (page 664), and `TupletNumber` (page 665).

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.

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): `Accidental` (page 475), `AccidentalCautionary` (page 476), `AccidentalPlacement` (page 477), and `AccidentalSuggestion` (page 478).

`Accidental_engraver` is part of the following context(s) in `\layout`: `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), and `VaticanaStaff` (page 366).

2.2.2 Alteration_glyph_engraver

Set the `glyph-name-alist` of all grobs having the `accidental-switch-interface` to the value of the context's `alterationGlyphs` property, when defined.

Properties (read)

`alterationGlyphs (list)`

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., $-1/2$ for flat. This applies to all grobs that can print accidentals.

`Alteration_glyph_engraver` is part of the following context(s) in `\layout`: `ChordGrid` (page 68), `ChordNames` (page 95), `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `NoteNames` (page 226), `PetrucchiStaff` (page 231), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.3 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): `AccidentalPlacement` (page 477), `Ambitus` (page 479), `AmbitusAccidental` (page 481), `AmbitusLine` (page 482), and `AmbitusNoteHead` (page 482).

`Ambitus_engraver` is not part of any context

2.2.4 `Arpeggio_engraver`

Generate an Arpeggio symbol.

Music types accepted: `arpeggio-event` (page 49),

This engraver creates the following layout object(s): `Arpeggio` (page 483).

`Arpeggio_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.5 `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 2.2.141 [`Stem_engraver`], page 450, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted: `beam-forbid-event` (page 49),

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): `Beam` (page 495).

`Auto_beam_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189),

MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.6 Axis_group_engraver

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 items (clef, key signature, etc.).

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): VerticalAxisGroup (page 670).

Axis_group_engraver is part of the following context(s) in \layout: ChordGrid (page 68), ChordNames (page 95), DrumStaff (page 108), Dynamics (page 127), FiguredBass (page 132), FretBoards (page 133), GregorianTranscriptionLyrics (page 138), GregorianTranscriptionStaff (page 140), InternalGregorianStaff (page 163), KievanStaff (page 176), Lyrics (page 199), MensuralStaff (page 202), NoteNames (page 226), OneStaff (page 230), PetrucciStaff (page 231), RhythmicStaff (page 257), Staff (page 287), StandaloneRhythmStaff (page 326), TabStaff (page 341), VaticanaLyrics (page 364), and VaticanaStaff (page 366).

2.2.7 Balloon_engraver

Create balloon texts.

Music types accepted: annotate-output-event (page 49),

This engraver creates the following layout object(s): BalloonText (page 485).

Balloon_engraver is not part of any context

2.2.8 Bar_engraver

Create bar lines for various commands, including \bar.

If forbidBreakBetweenBarLines is true, allow line breaks at bar lines only.

Music types accepted: ad-hoc-jump-event (page 48), caesura-event (page 50), coda-mark-event (page 50), dal-segno-event (page 51), fine-event (page 51), section-event (page 56), segno-mark-event (page 56), and volta-span-event (page 59),

Properties (read)

caesuraType (list)

An alist

((bar-line . bar-type)

(breath . breath-type)

(scripts . script-type...)

(underlying-bar-line . bar-type))

specifying which breath mark, bar line, and scripts to create at \caesura. All entries are optional.

bar-line has higher priority than a measure bar line and underlying-bar-line has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one `\repeat volta` coincides with the start of another. The default is `':...:'`.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one `\repeat volta` and the beginning of another. The default is `':|.S.|:'`.

`endRepeatBarType` (string)

Bar line to insert at the end of a `\repeat volta`. The default is `':|.'`.

`endRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S.'`.

`fineBarType` (string)

Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'|.'`.

`fineSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with `\fine`. The default is `'|.S.'`.

`fineStartRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `'|.S.|:'`.

`forbidBreakBetweenBarLines` (boolean)

If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`measureBarType` (string)

Bar line to insert at a measure boundary.

`repeatCommands` (list)

A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`

End a repeated section.

- `start-repeat`
Start a repeated section.
 - `volta text`
If *text* is markup, start a volta bracket with that label; if *text* is #f, end a volta bracket.
 - `sectionBarType (string)`
Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '| |'.
 - `segnoBarType (string)`
Bar line to insert at an in-staff segno. The default is 'S'.
 - `segnoStyle (symbol)`
A symbol that indicates how to print a segno: bar-line or mark.
 - `startRepeatBarType (string)`
Bar line to insert at the start of a `\repeat volta`. The default is '. | : '.
 - `startRepeatSegnoBarType (string)`
Bar line to insert where an in-staff segno coincides with the start of a `\repeat volta`. The default is 'S. | : '.
 - `underlyingRepeatBarType (string)`
Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '| |'.
 - `whichBar (string)`
The current bar line type, or '()' if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.
- Properties (write)
- `currentBarLine (graphical (layout) object)`
Set to the BarLine that Bar_engraver has created in the current timestep.
 - `forbidBreak (boolean)`
If set to #t, prevent a line break at this point, except if explicitly requested by the user.

This engraver creates the following layout object(s): BarLine (page 486).

Bar_engraver is part of the following context(s) in `\layout`: ChordGrid (page 68), DrumStaff (page 108), Dynamics (page 127), GregorianTranscriptionStaff (page 140), InternalGregorianStaff (page 163), KievanStaff (page 176), MensuralStaff (page 202), PetrucciStaff (page 231), RhythmicStaff (page 257), Staff (page 287), StandaloneRhythmStaff (page 326), TabStaff (page 341), and VaticanaStaff (page 366).

2.2.9 Bar_number_engraver

A bar number may be created at any bar line, subject to the `barNumberVisibility` callback. By default, 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 2.2.135 [Staff_collecting_engraver], page 448. This engraver usually creates BarNumber grobs, but when `centerBarNumbers` is true, it makes CenteredBarNumber grobs instead.

Properties (read)

`alternativeNumber` (non-negative, exact integer)

When set, the index of the current \alternative element, starting from one. Not set outside of alternatives. Note the distinction from volta number: an alternative may pertain to multiple volte.

`alternativeNumberingStyle` (symbol)

The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to numbers to reset the bar number at each alternative, or set to numbers-with-letters to reset and also include letter suffixes.

`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.

`centerBarNumbers` (boolean)

Whether to center bar numbers in their measure instead of aligning them on the bar line.

`currentBarNumber` (integer)

Contains the current barnumber. This property is incremented at every bar line.

`currentCommandColumn` (graphical (layout) object)

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

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to `#t` when an event forcing a line break was heard.

`measurePosition` (moment)

How much of the current measure have we had. This can be set manually to create incomplete measures.

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `BarNumber` (page 489), and `CenteredBarNumber` (page 506).

`Bar_number_engraver` is part of the following context(s) in `\layout`: `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.10 `Beam_collision_engraver`

Help beams avoid colliding with notes and clefs in other voices.

`Beam_collision_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.11 `Beam_engraver`

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted: `beam-event` (page 49),

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): `Beam` (page 495).

`Beam_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `NullVoice` (page 228), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.12 `Beam_performer`

Music types accepted: `beam-event` (page 49),

`Beam_performer` is part of the following context(s) in `\midi`: `ChordNames` (page 95), `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `NullVoice` (page 228), `PetrucchiVoice` (page 245), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.13 Beat_engraver

This engraver is just a functionally identical copy of Section 2.2.14 [Beat_performer], page 409, used for visualising its effects. You can also use it for showcasing the effects of the current beatStructure.

Music types accepted: articulation-event (page 49), and note-event (page 54),

Properties (read)

barExtraVelocity (integer)

Extra MIDI velocity added by the ‘Beat_performer’ at the start of each measure.

baseMoment (moment)

Smallest unit of time that will stand on its own as a subdivided section.

beatExtraVelocity (integer)

Extra MIDI velocity added by the ‘Beat_performer’ at the start of each beat.

beatStructure (list)

List of baseMoments that are combined to make beats.

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 (boolean)

Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

Beat_engraver is not part of any context

2.2.14 Beat_performer

This performer is intended for instantiation in ‘Voice’-like contexts. The context variable beatExtraVelocity is used for adding extra MIDI velocity at each beat (default 15) in accordance with beatStructure and an additional barExtraVelocity (default 10) at the start of each bar.

This is done by adding corresponding \accent and \marcato events when such note events are encountered.

Off-beat manual use of \accent or \marcato causes autogeneration of the next on-beat accent to be skipped.

Music types accepted: articulation-event (page 49), and note-event (page 54),

Properties (read)

barExtraVelocity (integer)

Extra MIDI velocity added by the ‘Beat_performer’ at the start of each measure.

baseMoment (moment)

Smallest unit of time that will stand on its own as a subdivided section.

beatExtraVelocity (integer)

Extra MIDI velocity added by the ‘Beat_performer’ at the start of each beat.

beatStructure (list)

List of baseMoments that are combined to make beats.

`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` (boolean)

Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

`Beat_performer` is not part of any context

2.2.15 Bend_engraver

Create fall spanners.

Music types accepted: `bend-after-event` (page 49),

Properties (read)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bend_engraver` has created in the current timestep.

`currentCommandColumn` (graphical (layout) object)

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

`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): `BendAfter` (page 497).

`Bend_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.16 Bend_spanner_engraver

Engraver to print a `BendSpanner`.

Music types accepted: `bend-span-event` (page 50), `note-event` (page 54), and `string-number-event` (page 58),

Properties (read)

`stringFretFingerList` (list)

A list containing three entries. In `TabVoice` and `FretBoards` they determine the string, fret and finger to use

`supportNonIntegerFret` (boolean)

If set in `Score` the `TabStaff` will print micro-tones as $2\frac{1}{2}$

Properties (write)

`stringFretFingerList` (list)

A list containing three entries. In `TabVoice` and `FretBoards` they determine the string, fret and finger to use

`supportNonIntegerFret` (boolean)

If set in `Score` the `TabStaff` will print micro-tones as $2\frac{1}{2}$

This engraver creates the following layout object(s): `BendSpanner` (page 498).

`Bend_spanner_engraver` is part of the following context(s) in `\layout`: `TabVoice` (page 353).

2.2.17 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): `BreakAlignGroup` (page 500), `BreakAlignment` (page 501), and `LeftEdge` (page 571).

`Break_align_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.18 Breathing_sign_engraver

Notate breath marks.

Music types accepted: `breathing-event` (page 50),

Properties (read)

`breathMarkType` (symbol)

The type of `BreathingSign` to create at `\breathe`.

This engraver creates the following layout object(s): `BreathingSign` (page 502).

`Breathing_sign_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.19 Caesura_engraver

Notate a short break in sound that does not shorten the previous note.

Depending on the result of passing the value of `caesuraType` through `caesuraTypeTransform`, this engraver may create a `BreathingSign` with `CaesuraScript` grobs aligned to it, or it may create `CaesuraScript` grobs and align them to a `BarLine`.

If this engraver observes a `BarLine`, it calls `caesuraTypeTransform` again with the new information, and if necessary, recreates its grobs.

Music types accepted: `caesura-event` (page 50),

Properties (read)

`breathMarkDefinitions` (list)

The description of breath marks. This is used by the `Breathing_sign_engraver`. See `scm/breath.scm` for more information.

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

`bar-line` has higher priority than a measure bar line and `underlying-bar-line` has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

`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): `BreathingSign` (page 502), and `CaesuraScript` (page 505).

`Caesura_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `RhythmicStaff` (page 257), `Staff` (page 287), `StandaloneRhythmStaff` (page 326), and `TabStaff` (page 341).

2.2.20 `Centered_bar_number_align_engraver`

Group measure-centered bar numbers in a `CenteredBarNumberLineSpanner` so they end up on the same vertical position.

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `CenteredBarNumberLineSpanner` (page 507).

`Centered_bar_number_align_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.21 `Chord_name_engraver`

Read `currentChordText` to create chord names.

Properties (read)

`chordChanges` (boolean)

Only show changes in chords scheme?

`currentChordCause` (stream event)

Event cause of the chord that should be created in this time step (if any).

`currentChordText` (markup)

In contexts printing chord names, this is at any point of time the markup that will be put in the chord name.

`lastChord` (markup)

Last chord, used for detecting chord changes.

Properties (write)

`lastChord` (markup)

Last chord, used for detecting chord changes.

This engraver creates the following layout object(s): ChordName (page 508).

Chord_name_engraver is part of the following context(s) in \layout: ChordNames (page 95).

2.2.22 Chord_square_engraver

Engrave chord squares in chord grids.

Properties (read)

currentCommandColumn (graphical (layout) object)

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

This engraver creates the following layout object(s): ChordSquare (page 509).

Chord_square_engraver is part of the following context(s) in \layout: ChordGrid (page 68).

2.2.23 Chord_tremolo_engraver

Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 59),

This engraver creates the following layout object(s): Beam (page 495).

Chord_tremolo_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumVoice (page 118), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.24 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.

forbidBreak (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

forceBreak (boolean)

Set to #t when an event forcing a line break was heard.

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): `Clef` (page 510), and `ClefModifier` (page 513).

`Clef_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.25 `Cluster_spanner_engraver`

Engrave a cluster using `Spanner` notation.

Music types accepted: `cluster-note-event` (page 50),

This engraver creates the following layout object(s): `ClusterSpanner` (page 514), and `ClusterSpannerBeacon` (page 515).

`Cluster_spanner_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.26 `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): `NoteCollision` (page 594).

`Collision_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.27 `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: `note-event` (page 54),

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): NoteHead (page 596), Tie (page 654), and TieColumn (page 656).

Completion_heads_engraver is not part of any context

2.2.28 Completion_rest_engraver

This engraver replaces Rest_engraver. It plays some trickery to break long rests into the next measure.

Music types accepted: rest-event (page 55),

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.

Properties (write)

restCompletionBusy (boolean)

Signal whether a completion-rest is active.

This engraver creates the following layout object(s): Rest (page 611).

Completion_rest_engraver is not part of any context

2.2.29 Concurrent_hairpin_engraver

Collect concurrent hairpins.

Concurrent_hairpin_engraver is part of the following context(s) in \layout: ChordGridScore (page 73), Score (page 263), and StandaloneRhythmScore (page 302).

2.2.30 Control_track_performer

Properties (read)

midiSkipOffset (moment)

This is the accrued MIDI offset to account for time skipped via skipTypesetting.

Control_track_performer is part of the following context(s) in \midi: ChordGridScore (page 73), and Score (page 263).

2.2.31 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.

forbidBreak (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

forceBreak (boolean)

Set to #t when an event forcing a line break was heard.

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): ClefModifier (page 513), CueClef (page 521), and CueEndClef (page 524).

Cue_clef_engraver is part of the following context(s) in \layout: DrumStaff (page 108), GregorianTranscriptionStaff (page 140), InternalGregorianStaff (page 163), KievanStaff (page 176), MensuralStaff (page 202), PetrucciStaff (page 231), Staff (page 287), TabStaff (page 341), and VaticanaStaff (page 366).

2.2.32 Current_chord_text_engraver

Catch note and rest events and generate the appropriate chord text using chordNameFunction. Actually creating a chord name grob is left to other engravers.

Music types accepted: general-rest-event (page 52), and note-event (page 54),

Properties (read)

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.

`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)

`currentChordCause` (stream event)

Event cause of the chord that should be created in this time step (if any).

`currentChordText` (markup)

In contexts printing chord names, this is at any point of time the markup that will be put in the chord name.

`Current_chord_text_engraver` is part of the following context(s) in `\layout`: `ChordGrid` (page 68), and `ChordNames` (page 95).

2.2.33 `Custos_engraver`

Engrave custodes.

Properties (read)

`forbidBreak` (boolean)

If set to `#t`, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to `#t` when an event forcing a line break was heard.

This engraver creates the following layout object(s): `Custos` (page 527).

`Custos_engraver` is part of the following context(s) in `\layout`: `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), and `VaticanaStaff` (page 366).

2.2.34 `Divisio_engraver`

Create divisiones: chant notation for points of breathing or caesura.

Music types accepted: `caesura-event` (page 50), `fine-event` (page 51), `section-event` (page 56), `volta-repeat-end-event` (page 59), and `volta-repeat-start-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at `\caesura`. All entries are optional.

bar-line has higher priority than a measure bar line and underlying-bar-line has lower priority than a measure bar line.

`caesuraTypeTransform` (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

The second argument is the value of `caesuraType` with an additional entry (`articulations . symbol-list`) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. `bar-line` indicates that the engraver has observed a `BarLine` at the current moment.

This engraver creates the following layout object(s): `Divisio` (page 528).

`Divisio_engraver` is part of the following context(s) in `\layout`: `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), and `VaticanaStaff` (page 366).

2.2.35 `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): `DotColumn` (page 531).

`Dot_column_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `RhythmicStaff` (page 257), `Staff` (page 287), `StandaloneRhythmStaff` (page 326), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.36 `Dots_engraver`

Create Section 3.1.43 [Dots], page 531, objects for Section 3.2.118 [rhythmic-head-interface], page 736s.

This engraver creates the following layout object(s): `Dots` (page 531).

`Dots_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.37 `Double_percent_repeat_engraver`

Make double measure repeats.

Music types accepted: `double-percent-event` (page 51),

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, except if explicitly requested by the user.

This engraver creates the following layout object(s): DoublePercentRepeat (page 532), and DoublePercentRepeatCounter (page 534).

Double_percent_repeat_engraver is part of the following context(s) in \layout: ChordGrid (page 68), CueVoice (page 98), DrumVoice (page 118), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.38 Drum_note_performer

Play drum notes.

Music types accepted: articulation-event (page 49), note-event (page 54), and tie-event (page 58),

Drum_note_performer is part of the following context(s) in \midi: DrumVoice (page 118).

2.2.39 Drum_notes_engraver

Generate drum note heads.

Music types accepted: note-event (page 54),

Properties (read)

drumStyleTable (hash table)

A hash table which maps drums to layout settings. Predefined values: 'drums-style', 'agostini-drums-style', 'weinberg-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): NoteHead (page 596), and Script (page 612).

Drum_notes_engraver is part of the following context(s) in \layout: DrumVoice (page 118).

2.2.40 Duration_line_engraver

Engraver to print a line representing the duration of a rhythmic event like NoteHead, NoteColumn or Rest.

Music types accepted: duration-line-event (page 51),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

currentMusicalColumn (graphical (layout) object)

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

endAtSkip (boolean)
 End DurationLine grob on skip-event

startAtNoteColumn (boolean)
 Start DurationLine grob at entire NoteColumn.

startAtSkip (boolean)
 Start DurationLine grob at skip-event.

This engraver creates the following layout object(s): DurationLine (page 536).

Duration_line_engraver is not part of any context

2.2.41 Dynamic_align_engraver

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): DynamicLineSpanner (page 538).

Dynamic_align_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumVoice (page 118), Dynamics (page 127), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.42 Dynamic_engraver

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: absolute-dynamic-event (page 48), break-dynamic-span-event (page 50), and span-dynamic-event (page 56),

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): DynamicText (page 539), DynamicTextSpanner (page 541), and Hairpin (page 555).

Dynamic_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumVoice (page 118), Dynamics (page 127), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.43 **Dynamic_performer**

Music types accepted: `absolute-dynamic-event` (page 48), `crescendo-event` (page 50), and `decrescendo-event` (page 51),

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 part of the following context(s) in `\midi`: `ChordNames` (page 95), `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.44 **Episema_engraver**

Create an *Editio Vaticana*-style episema line.

Music types accepted: `episema-event` (page 51),

This engraver creates the following layout object(s): `Episema` (page 543).

`Episema_engraver` is part of the following context(s) in `\layout`:

`GregorianTranscriptionVoice` (page 153), and `VaticanaVoice` (page 380).

2.2.45 **Extender_engraver**

Create lyric extenders.

Music types accepted: `completize-extender-event` (page 50), and `extender-event` (page 51),

Properties (read)

`extendersOverRests` (boolean)

Whether to continue extenders as they cross a rest.

This engraver creates the following layout object(s): `LyricExtender` (page 574).

`Extender_engraver` is part of the following context(s) in `\layout`:

`GregorianTranscriptionLyrics` (page 138), `Lyrics` (page 199), and `VaticanaLyrics` (page 364).

2.2.46 **Figured_bass_engraver**

Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 49), and `rest-event` (page 55),

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): `BassFigure` (page 491), `BassFigureAlignment` (page 492), `BassFigureBracket` (page 493), `BassFigureContinuation` (page 494), and `BassFigureLine` (page 494).

`Figured_bass_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `FiguredBass` (page 132), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.47 `Figured_bass_position_engraver`

Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 492).

`Figured_bass_position_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.48 `Finger_glide_engraver`

Engraver to print a line between two Fingering grobs.

Music types accepted: `note-event` (page 54),

This engraver creates the following layout object(s): `FingerGlideSpanner` (page 544).

`Finger_glide_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.49 `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): `FingeringColumn` (page 547).

`Fingering_column_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.50 Fingering_engraver

Create fingering scripts.

Music types accepted: `fingering-event` (page 51),

This engraver creates the following layout object(s): `Fingering` (page 545).

`Fingering_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.51 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) in `\layout`: `CueVoice` (page 98), `DrumStaff` (page 108), `DrumVoice` (page 118), `Dynamics` (page 127), `FretBoards` (page 133), `GregorianTranscriptionLyrics` (page 138), `GregorianTranscriptionStaff` (page 140), `GregorianTranscriptionVoice` (page 153), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `KievanVoice` (page 189), `Lyrics` (page 199), `MensuralStaff` (page 202), `MensuralVoice` (page 216), `PetrucchiStaff` (page 231), `PetrucchiVoice` (page 245), `RhythmicStaff` (page 257), `Staff` (page 287), `StandaloneRhythmStaff` (page 326), `StandaloneRhythmVoice` (page 331), `TabStaff` (page 341), `TabVoice` (page 353), `VaticanaLyrics` (page 364), `VaticanaStaff` (page 366), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.52 Footnote_engraver

Create footnote texts.

This engraver creates the following layout object(s): `Footnote` (page 549).

`Footnote_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.53 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, except if explicitly requested by the user.

`Forbid_line_break_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.54 Fretboard_engraver

Generate fret diagram from one or more events of type NoteEvent.

Music types accepted: `fingering-event` (page 51), `note-event` (page 54), and `string-number-event` (page 58),

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): `FretBoard` (page 550).

`Fretboard_engraver` is part of the following context(s) in `\layout`: `FretBoards` (page 133).

2.2.55 Glissando_engraver

Engrave glissandi.

Music types accepted: `glissando-event` (page 52),

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): `Glissando` (page 552).

Glissando_engraver is part of the following context(s) in \layout: CueVoice (page 98), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.56 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: beam-forbid-event (page 49),

Properties (read)

autoBeaming (boolean)

If set to true then beams are generated automatically.

This engraver creates the following layout object(s): Beam (page 495).

Grace_auto_beam_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumVoice (page 118), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.57 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: beam-event (page 49),

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): Beam (page 495).

Grace_beam_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumVoice (page 118), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.58 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) in \layout: CueVoice (page 98), DrumVoice (page 118), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.59 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): `GraceSpacing` (page 553).

`Grace_spacing_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.60 Grid_chord_name_engraver

Read `currentChordText` to create chord names adapted for typesetting within a chord grid.

Properties (read)

`currentChordCause` (stream event)

Event cause of the chord that should be created in this time step (if any).

`currentChordText` (markup)

In contexts printing chord names, this is at any point of time the markup that will be put in the chord name.

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `GridChordName` (page 553).

`Grid_chord_name_engraver` is part of the following context(s) in `\layout`: `ChordGrid` (page 68).

2.2.61 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): `GridLine` (page 554).

`Grid_line_span_engraver` is not part of any context

2.2.62 Grid_point_engraver

Generate grid points.

Properties (read)

`gridInterval` (moment)

Interval for which to generate `GridPoints`.

This engraver creates the following layout object(s): `GridPoint` (page 555).

`Grid_point_engraver` is not part of any context

2.2.63 Grob_pq_engraver

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.).

Grob_pq_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumStaff (page 108), DrumVoice (page 118), GregorianTranscriptionStaff (page 140), GregorianTranscriptionVoice (page 153), InternalGregorianStaff (page 163), KievanStaff (page 176), KievanVoice (page 189), MensuralStaff (page 202), MensuralVoice (page 216), NullVoice (page 228), PetrucciStaff (page 231), PetrucciVoice (page 245), Staff (page 287), StandaloneRhythmVoice (page 331), TabStaff (page 341), TabVoice (page 353), VaticanaStaff (page 366), VaticanaVoice (page 380), and Voice (page 390).

2.2.64 Horizontal_bracket_engraver

Create horizontal brackets over notes for musical analysis purposes.

Music types accepted: note-grouping-event (page 54),

This engraver creates the following layout object(s): HorizontalBracket (page 557), and HorizontalBracketText (page 558).

Horizontal_bracket_engraver is not part of any context

2.2.65 Hyphen_engraver

Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted: hyphen-event (page 52), and vowel-transition-event (page 59),

This engraver creates the following layout object(s): LyricHyphen (page 575), LyricSpace (page 578), and VowelTransition (page 675).

Hyphen_engraver is part of the following context(s) in \layout: GregorianTranscriptionLyrics (page 138), Lyrics (page 199), and VaticanaLyrics (page 364).

2.2.66 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 items (clef, key signature, etc.).

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): InstrumentName (page 559).

Instrument_name_engraver is part of the following context(s) in \layout: ChoirStaff (page 66), DrumStaff (page 108), FretBoards (page 133), GrandStaff

(page 136), GregorianTranscriptionLyrics (page 138), GregorianTranscriptionStaff (page 140), InternalGregorianStaff (page 163), KievanStaff (page 176), Lyrics (page 199), MensuralStaff (page 202), PetrucciStaff (page 231), PianoStaff (page 255), RhythmicStaff (page 257), Staff (page 287), StaffGroup (page 300), StandaloneRhythmStaff (page 326), TabStaff (page 341), VaticanaLyrics (page 364), and VaticanaStaff (page 366).

2.2.67 Instrument_switch_engraver

Create a cue text for taking instrument.

This engraver is deprecated.

Properties (read)

instrumentCueName (markup)

The name to print if another instrument is to be taken.

This property is deprecated

This engraver creates the following layout object(s): InstrumentSwitch (page 560).

Instrument_switch_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumVoice (page 118), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.68 Jump_engraver

This engraver creates instructions such as *D.C.* and *Fine*, placing them vertically outside the set of staves given in the stavesFound context property.

If Jump_engraver is added or moved to another context, Staff_collecting_engraver (page 448), also needs to be there so that marks appear at the intended Y location.

Music types accepted: ad-hoc-jump-event (page 48), dal-segno-event (page 51), and fine-event (page 51),

Properties (read)

codaMarkCount (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

codaMarkFormatter (procedure)

A procedure that creates a coda mark (which in conventional *D.S. al Coda* form indicates the start of the alternative endings), taking as arguments the mark sequence number and the context. It should return a markup object.

dalSegnoTextFormatter (procedure)

Format a jump instruction such as *D.S.*

The first argument is the context.

The second argument is the number of times the instruction is performed.

The third argument is a list of three markups: *start-markup*, *end-markup*, and *next-markup*.

If *start-markup* is #f, the form is *da capo*; otherwise the form is *dal segno* and *start-markup* is the sign at the start of the repeated section.

If *end-markup* is not #f, it is either the sign at the end of the main body of the repeat, or it is a *Fine* instruction. When it is a *Fine* instruction, *next-markup* is #f.

If *next-markup* is not #f, it is the mark to be jumped to after performing the body of the repeat, e.g., Coda.

`finalFineTextVisibility` (boolean)

Whether `\fine` at the written end of the music should create a *Fine* instruction.

`fineText` (markup)

The text to print at `\fine`.

`segnoMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

`segnoMarkFormatter` (procedure)

A procedure that creates a segno (which conventionally indicates the start of a repeated section), taking as arguments the mark sequence number and the context. It should return a markup object.

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `JumpScript` (page 561).

`Jump_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.69 `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) in `\layout`: `PianoStaff` (page 255).

2.2.70 `Key_engraver`

Engrave a key signature.

Music types accepted: `key-change-event` (page 52),

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.

`forbidBreak` (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

`forceBreak` (boolean)

Set to #t when an event forcing a line break was heard.

`keyAlterationOrder` (list)

A list of pairs that defines in what order alterations should be printed. The format of an entry is *(step . alter)*, where *step* is a number from 0 to 6 and *alter* from -1 (double flat) to 1 (double sharp), with exact rationals for alterations in between, e.g., 1/2 for sharp.

`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): `KeyCancellation` (page 563), and `KeySignature` (page 566).

`Key_engraver` is part of the following context(s) in `\layout`: `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), and `VaticanaStaff` (page 366).

2.2.71 Key_performer

Music types accepted: `key-change-event` (page 52),

Properties (read)

`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`.

`Key_performer` is part of the following context(s) in `\midi`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `RhythmicStaff` (page 257), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.72 Kievan_ligature_engraver

Handle Kievan_ligature_events by glueing Kievan heads together.

Music types accepted: `ligature-event` (page 52),

This engraver creates the following layout object(s): `KievanLigature` (page 568).

`Kievan_ligature_engraver` is part of the following context(s) in `\layout`: `KievanVoice` (page 189).

2.2.73 Laissez_vibrer_engraver

Create laissez vibrer items.

Music types accepted: `laissez-vibrer-event` (page 52),

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 569), and `LaissezVibrerTieColumn` (page 570).

`Laissez_vibrer_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.74 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): `LedgerLineSpanner` (page 570).

`Ledger_line_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `RhythmicStaff` (page 257), `Staff` (page 287), `StandaloneRhythmStaff` (page 326), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.75 Ligature_bracket_engraver

Handle Ligature_events by engraving Ligature brackets.

Music types accepted: `ligature-event` (page 52),

This engraver creates the following layout object(s): `LigatureBracket` (page 573).

`Ligature_bracket_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `GregorianTranscriptionVoice` (page 153), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), and `Voice` (page 390).

2.2.76 Lyric_engraver

Engrave text for lyrics.

Music types accepted: `lyric-event` (page 53),

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): `LyricText` (page 578).

`Lyric_engraver` is part of the following context(s) in `\layout`: `GregorianTranscriptionLyrics` (page 138), `Lyrics` (page 199), and `VaticanaLyrics` (page 364).

2.2.77 `Lyric_performer`

Music types accepted: `lyric-event` (page 53),

`Lyric_performer` is part of the following context(s) in `\midi`: `GregorianTranscriptionLyrics` (page 138), and `Lyrics` (page 199).

2.2.78 `Lyric_repeat_count_engraver`

Create repeat counts within lyrics for modern transcriptions of Gregorian chant.

Music types accepted: `volta-repeat-end-event` (page 59),

Properties (read)

`lyricRepeatCountFormatter` (procedure)

A procedure taking as arguments the context and the numeric repeat count. It should return the formatted repeat count as markup. If it does not return markup, no grob is created.

This engraver creates the following layout object(s): `LyricRepeatCount` (page 576).

`Lyric_repeat_count_engraver` is part of the following context(s) in `\layout`: `GregorianTranscriptionLyrics` (page 138).

2.2.79 `Mark_engraver`

This engraver creates rehearsal marks, segno and coda marks, and section labels.

`Mark_engraver` creates marks, formats them, and places them vertically outside the set of staves given in the `stavesFound` context property.

If `Mark_engraver` is added or moved to another context, `Staff_collecting_engraver` (page 448), also needs to be there so that marks appear at the intended Y location.

By default, `Mark_engravers` in multiple contexts create a common sequence of marks chosen by the Score-level `Mark_tracking_translator` (page 433). If independent sequences are desired, multiple `Mark_tracking_translators` must be used.

Properties (read)

`codaMarkFormatter` (procedure)

A procedure that creates a coda mark (which in conventional *D.S. al Coda* form indicates the start of the alternative endings), taking as arguments the mark sequence number and the context. It should return a markup object.

`currentPerformanceMarkEvent` (stream event)

The coda, section, or segno mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`currentRehearsalMarkEvent` (stream event)

The ad-hoc or rehearsal mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`rehearsalMarkFormatter` (procedure)

A procedure taking as arguments the context and the sequence number of the rehearsal mark. It should return the formatted mark as a markup object.

`segnoMarkFormatter` (procedure)

A procedure that creates a segno (which conventionally indicates the start of a repeated section), taking as arguments the mark sequence number and the context. It should return a markup object.

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `CodaMark` (page 515), `RehearsalMark` (page 607), `SectionLabel` (page 614), and `SegnoMark` (page 616).

`Mark_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.80 `Mark_performer`

This performer emits MIDI markers for rehearsal marks, segno and coda marks, and section labels. The MIDI markers are derived from markup that is generated as in the `Mark_engraver`.

Properties (read)

`currentPerformanceMarkEvent` (stream event)

The coda, section, or segno mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`currentRehearsalMarkEvent` (stream event)

The ad-hoc or rehearsal mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`Mark_performer` is part of the following context(s) in `\midi`: `ChordGridScore` (page 73), and `Score` (page 263).

2.2.81 `Mark_tracking_translator`

This translator chooses which marks `Mark_engraver` should engrave.

Music types accepted: `ad-hoc-mark-event` (page 49), `coda-mark-event` (page 50), `rehearsal-mark-event` (page 55), `section-label-event` (page 56), and `segno-mark-event` (page 56),

Properties (read)

`codaMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

`rehearsalMark` (integer)

The next rehearsal mark to print.

`segnoMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

Properties (write)

`codaMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

`currentPerformanceMarkEvent` (stream event)

The coda, section, or segno mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`currentRehearsalMarkEvent` (stream event)

The ad-hoc or rehearsal mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`rehearsalMark` (integer)

The next rehearsal mark to print.

`segnoMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

`Mark_tracking_translator` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302); in `\midi`: `ChordGridScore` (page 73), and `Score` (page 263).

2.2.82 `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: `measure-counter-event` (page 53),

Properties (read)

`currentBarNumber` (integer)

Contains the current barnumber. This property is incremented at every bar line.

`currentCommandColumn` (graphical (layout) object)

Grob that is X-parent to all current breakable items (clef, key signature, 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): `MeasureCounter` (page 580).

`Measure_counter_engraver` is not part of any context

2.2.83 `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 `baseMoments` 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): `MeasureGrouping` (page 582).

`Measure_grouping_engraver` is not part of any context

2.2.84 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: `measure-spanner-event` (page 53),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

Grob that is X-parent to all current breakable items (clef, key signature, 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): `MeasureSpanner` (page 583).

`Measure_spanner_engraver` is not part of any context

2.2.85 Melody_engraver

Create information for context dependent typesetting decisions.

Properties (read)

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`suspendMelodyDecisions` (boolean)

When using the `Melody_engraver`, stop changing orientation of stems based on the melody when this is set to true.

This engraver creates the following layout object(s): `MelodyItem` (page 584).

`Melody_engraver` is not part of any context

2.2.86 Mensural_ligature_engraver

Handle `Mensural_ligature_events` by glueing special ligature heads together.

Music types accepted: `ligature-event` (page 52),

This engraver creates the following layout object(s): `MensuralLigature` (page 584).

`Mensural_ligature_engraver` is part of the following context(s) in `\layout`: `MensuralVoice` (page 216), and `PetrucchiVoice` (page 245).

2.2.87 Merge_mmrest_numbers_engraver

Engraver to merge multi-measure rest numbers in multiple voices.

This works by gathering all multi-measure rest numbers at a time step. If they all have the same text and there are at least two only the first one is retained and the others are hidden.

`Merge_mmrest_numbers_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.88 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_rest_engraver` do not merge rests when this is set to true.

Merge_rests_engraver is not part of any context

2.2.89 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 2.2.135 [`Staff_collecting_engraver`], page 448.

Music types accepted: `tempo-change-event` (page 58),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `MetronomeMark` (page 585).

`Metronome_mark_engraver` is part of the following context(s) in `\layout`:

`ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.90 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 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.

`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 part of the following context(s) in \midi: DrumStaff (page 108), GregorianTranscriptionStaff (page 140), KievanStaff (page 176), MensuralStaff (page 202), PetrucciStaff (page 231), RhythmicStaff (page 257), Staff (page 287), TabStaff (page 341), and VaticanaStaff (page 366).

2.2.91 Multi_measure_rest_engraver

Engrave multi-measure rests that are produced with ‘R’. It reads measureStartNow and internalBarNumber to determine what number to print over the Section 3.1.88 [MultiMeasureRest], page 587.

Music types accepted: multi-measure-articulation-event (page 53), multi-measure-rest-event (page 53), and multi-measure-text-event (page 53),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

internalBarNumber (integer)

Contains the current barnumber. This property is used for internal timekeeping, among others by the Accidental_engraver.

measureStartNow (boolean)

True at the beginning of a measure.

restNumberThreshold (number)

If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), and MultiMeasureRestText (page 591).

Multi_measure_rest_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumVoice (page 118), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.92 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 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): Fingering (page 545), Script (page 612), StringNumber (page 637), and StrokeFinger (page 639).

New_fingering_engraver is part of the following context(s) in \layout: CueVoice (page 98), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), VaticanaVoice (page 380), and Voice (page 390).

2.2.93 Non_musical_script_column_engraver

Find potentially colliding non-musical scripts and put them into a ScriptColumn object; that will fix the collisions.

This engraver creates the following layout object(s): ScriptColumn (page 613).

Non_musical_script_column_engraver is part of the following context(s) in \layout: DrumStaff (page 108), GregorianTranscriptionStaff (page 140), InternalGregorianStaff (page 163), KievanStaff (page 176), MensuralStaff (page 202), PetrucciStaff (page 231), Staff (page 287), TabStaff (page 341), and VaticanaStaff (page 366).

2.2.94 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): VoiceFollower (page 672).

Note_head_line_engraver is part of the following context(s) in \layout: CueVoice (page 98), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.95 Note_heads_engraver

Generate note heads.

Music types accepted: note-event (page 54),

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): NoteHead (page 596).

Note_heads_engraver is part of the following context(s) in \layout: CueVoice (page 98), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), NullVoice (page 228), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), VaticanaVoice (page 380), and Voice (page 390).

2.2.96 Note_name_engraver

Print pitches as words.

Music types accepted: note-event (page 54),

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): `NoteName` (page 597).

`Note_name_engraver` is part of the following context(s) in `\layout`: `NoteNames` (page 226).

2.2.97 Note_performer

Music types accepted: `articulation-event` (page 49), `breathing-event` (page 50), `note-event` (page 54), and `tie-event` (page 58),

`Note_performer` is part of the following context(s) in `\midi`: `ChordNames` (page 95), `CueVoice` (page 98), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.98 Note_spacing_engraver

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

This engraver creates the following layout object(s): `NoteSpacing` (page 597).

`Note_spacing_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.99 Ottava_spanner_engraver

Create a text spanner when the ottavation property changes.

Music types accepted: `ottava-event` (page 54),

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): `OttavaBracket` (page 598).

`Ottava_spanner_engraver` is part of the following context(s) in `\layout`: `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), and `VaticanaStaff` (page 366).

2.2.100 Output_property_engraver

Apply a procedure to any grob acknowledged.

Music types accepted: `apply-output-event` (page 49),

`Output_property_engraver` is part of the following context(s) in `\layout`: `ChoirStaff` (page 66), `ChordGrid` (page 68), `ChordGridScore` (page 73), `ChordNames` (page 95), `CueVoice` (page 98), `DrumStaff` (page 108), `DrumVoice` (page 118), `Dynamics` (page 127),

FretBoards (page 133), GrandStaff (page 136), GregorianTranscriptionStaff (page 140), GregorianTranscriptionVoice (page 153), InternalGregorianStaff (page 163), KievanStaff (page 176), KievanVoice (page 189), MensuralStaff (page 202), MensuralVoice (page 216), PetrucciStaff (page 231), PetrucciVoice (page 245), PianoStaff (page 255), RhythmicStaff (page 257), Score (page 263), Staff (page 287), StaffGroup (page 300), StandaloneRhythmScore (page 302), StandaloneRhythmStaff (page 326), StandaloneRhythmVoice (page 331), TabStaff (page 341), TabVoice (page 353), VaticanaStaff (page 366), VaticanaVoice (page 380), and Voice (page 390).

2.2.101 Page_turn_engraver

Decide where page turns are allowed to go.

Music types accepted: break-event (page 50),

Properties (read)

currentBarLine (graphical (layout) object)

Set to the BarLine that Bar_engraver has created in the current timestep.

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

2.2.102 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: break-event (page 50), and label-event (page 52),

Properties (read)

forbidBreak (boolean)

If set to #t, prevent a line break at this point, except if explicitly requested by the user.

Properties (write)

currentCommandColumn (graphical (layout) object)

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

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, except if explicitly requested by the user.

forceBreak (boolean)

Set to #t when an event forcing a line break was heard.

This engraver creates the following layout object(s): `NonMusicalPaperColumn` (page 593), and `PaperColumn` (page 599).

`Paper_column_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.103 `Parenthesis_engraver`

Parenthesize objects whose `parenthesize` property is `#t`.

This engraver creates the following layout object(s): `Parentheses` (page 600).

`Parenthesis_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.104 `Part_combine_engraver`

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

Music types accepted: `note-event` (page 54), and `part-combine-event` (page 55),

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): `CombineTextScript` (page 517).

`Part_combine_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.105 `Percent_repeat_engraver`

Make whole measure repeats.

Music types accepted: `percent-event` (page 55),

Properties (read)

`countPercentRepeats` (boolean)

If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)

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

`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): `PercentRepeat` (page 601), and `PercentRepeatCounter` (page 602).

`Percent_repeat_engraver` is part of the following context(s) in `\layout`: `ChordGrid` (page 68), `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.106 Phrasing_slur_engraver

Print phrasing slurs. Similar to Section 2.2.126 [`Slur_engraver`], page 447.

Music types accepted: `note-event` (page 54), and `phrasing-slur-event` (page 55),

This engraver creates the following layout object(s): `PhrasingSlur` (page 604).

`Phrasing_slur_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.107 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 items (clef, key signature, etc.).

This engraver creates the following layout object(s): `SostenutoPedalLineSpanner` (page 624), `SustainPedalLineSpanner` (page 641), and `UnaCordaPedalLineSpanner` (page 667).

`Piano_pedal_align_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.108 Piano_pedal_engraver

Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 56), `sustain-event` (page 58), and `una-corda-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): PianoPedalBracket (page 605), SostenutoPedal (page 623), SustainPedal (page 640), and UnaCordaPedal (page 666).

Piano_pedal_engraver is part of the following context(s) in \layout: Dynamics (page 127), GregorianTranscriptionStaff (page 140), InternalGregorianStaff (page 163), KievanStaff (page 176), MensuralStaff (page 202), PetrucciStaff (page 231), Staff (page 287), TabStaff (page 341), and VaticanaStaff (page 366).

2.2.109 Piano_pedal_performer

Music types accepted: sostenuto-event (page 56), sustain-event (page 58), and una-corda-event (page 59),

Piano_pedal_performer is part of the following context(s) in \midi: ChordNames (page 95), CueVoice (page 98), DrumVoice (page 118), Dynamics (page 127), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.110 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) in \layout: NullVoice (page 228), RhythmicStaff (page 257), and StandaloneRhythmStaff (page 326).

2.2.111 Pitched_trill_engraver

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): TrillPitchAccidental (page 659), TrillPitchGroup (page 660), TrillPitchHead (page 661), and TrillPitchParentheses (page 662).

Pitched_trill_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumVoice (page 118), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), VaticanaVoice (page 380), and Voice (page 390).

2.2.112 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) in \layout: DrumStaff (page 108), GregorianTranscriptionLyrics (page 138), GregorianTranscriptionStaff (page 140), InternalGregorianStaff (page 163), KievanStaff (page 176), Lyrics (page 199), MensuralStaff (page 202), PetrucciStaff (page 231), Staff (page 287), TabStaff (page 341), VaticanaLyrics (page 364), and VaticanaStaff (page 366).

2.2.113 Repeat_acknowledge_engraver

This translator adds entries to `repeatCommands` for events generated by `\repeat volta`.

Music types accepted: `volta-repeat-end-event` (page 59), and `volta-repeat-start-event` (page 59),

Properties (write)

`repeatCommands` (list)

A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`

End a repeated section.

`start-repeat`

Start a repeated section.

`volta text`

If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`Repeat_acknowledge_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.114 Repeat_tie_engraver

Create repeat ties.

Music types accepted: `repeat-tie-event` (page 55),

This engraver creates the following layout object(s): `RepeatTie` (page 609), and `RepeatTieColumn` (page 610).

`Repeat_tie_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.115 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): `RestCollision` (page 612).

`Rest_collision_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.116 Rest_engraver

Engrave rests.

Music types accepted: `rest-event` (page 55),

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): `Rest` (page 611).

`Rest_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.117 `Rhythmic_column_engraver`

Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 595).

`Rhythmic_column_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.118 `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): `ScriptColumn` (page 613).

`Script_column_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.119 `Script_engraver`

Handle note scripted articulations.

Music types accepted: `articulation-event` (page 49),

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): `Script` (page 612).

`Script_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `Dynamics` (page 127), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.120 `Script_row_engraver`

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 614).

`Script_row_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.121 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 `currentCommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s): `StaffSpacing` (page 632).

`Separating_line_group_engraver` is part of the following context(s) in `\layout`: `ChordNames` (page 95), `DrumStaff` (page 108), `FiguredBass` (page 132), `FretBoards` (page 133), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `NoteNames` (page 226), `PetrucchiStaff` (page 231), `RhythmicStaff` (page 257), `Staff` (page 287), `StandaloneRhythmStaff` (page 326), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.122 Show_control_points_engraver

Create grobs to visualize control points of Bézier curves (ties and slurs) for ease of tweaking.

This engraver creates the following layout object(s): `ControlPoint` (page 519), and `ControlPolygon` (page 520).

`Show_control_points_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.123 Signum_repetitionis_engraver

Create a `SignumRepetitionis` at the end of a `\repeat volta` section.

Music types accepted: `volta-repeat-end-event` (page 59),

This engraver creates the following layout object(s): `SignumRepetitionis` (page 618).

`Signum_repetitionis_engraver` is part of the following context(s) in `\layout`: `PetrucchiStaff` (page 231).

2.2.124 Skip_typesetting_engraver

Create a `StaffEllipsis` when `skipTypesetting` is used.

Properties (read)

`skipTypesetting` (boolean)

If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

This engraver creates the following layout object(s): `StaffEllipsis` (page 628).

`Skip_typesetting_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.125 Slash_repeat_engraver

Make beat repeats.

Music types accepted: repeat-slash-event (page 55),

This engraver creates the following layout object(s): DoubleRepeatSlash (page 535), and RepeatSlash (page 608).

Slash_repeat_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumVoice (page 118), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.126 Slur_engraver

Build slur grobs from slur events.

Music types accepted: note-event (page 54), and slur-event (page 56),

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): Slur (page 621).

Slur_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumVoice (page 118), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), NullVoice (page 228), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), and Voice (page 390).

2.2.127 Slur_performer

Music types accepted: slur-event (page 56),

Slur_performer is part of the following context(s) in \midi: ChordNames (page 95), CueVoice (page 98), DrumVoice (page 118), GregorianTranscriptionVoice (page 153), KievanVoice (page 189), MensuralVoice (page 216), NullVoice (page 228), PetrucciVoice (page 245), TabVoice (page 353), VaticanaVoice (page 380), and Voice (page 390).

2.2.128 Spacing_engraver

Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.

Music types accepted: spacing-section-event (page 56),

Properties (read)

currentCommandColumn (graphical (layout) object)

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

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): SpacingSpanner (page 625).

Spacing_engraver is part of the following context(s) in \layout: ChordGridScore (page 73), Score (page 263), and StandaloneRhythmScore (page 302).

2.2.129 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): `Arpeggio` (page 483).

`Span_arpeggio_engraver` is part of the following context(s) in `\layout`: `ChoirStaff` (page 66), `GrandStaff` (page 136), `PianoStaff` (page 255), and `StaffGroup` (page 300).

2.2.130 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): `SpanBar` (page 626).

`Span_bar_engraver` is part of the following context(s) in `\layout`: `GrandStaff` (page 136), `PianoStaff` (page 255), and `StaffGroup` (page 300).

2.2.131 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): `SpanBarStub` (page 627).

`Span_bar_stub_engraver` is part of the following context(s) in `\layout`: `ChoirStaff` (page 66), `GrandStaff` (page 136), `PianoStaff` (page 255), and `StaffGroup` (page 300).

2.2.132 Span_stem_engraver

Connect cross-staff stems to the stems above in the system

This engraver creates the following layout object(s): `Stem` (page 634).

`Span_stem_engraver` is not part of any context

2.2.133 Spanner_break_forbid_engraver

Forbid breaks in certain spanners.

`Spanner_break_forbid_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.134 Spanner_tracking_engraver

Helper for creating spanners attached to other spanners. If a spanner has the `sticky-grob-interface`, the engraver tracks the spanner contained in its `sticky-host` object. When the host ends, the sticky spanner attached to it has its end announced too.

`Spanner_tracking_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.135 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) in `\layout`: `ChordGridScore` (page 73), `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `Score` (page 263), `Staff` (page 287), `StandaloneRhythmScore` (page 302), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.136 `Staff_highlight_engraver`

Highlights music passages.

Music types accepted: `staff-highlight-event` (page 57),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s): `StaffHighlight` (page 631).

`Staff_highlight_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `RhythmicStaff` (page 257), `Staff` (page 287), `StandaloneRhythmStaff` (page 326), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.137 `Staff_performer`

Properties (read)

`midiChannelMapping` (symbol)

How to map MIDI channels: `per staff` (default), `instrument` or `voice`.

`midiMergeUnisons` (boolean)

If true, output only one MIDI note-on event when notes with the same pitch, in the same MIDI-file track, overlap.

`midiSkipOffset` (moment)

This is the accrued MIDI offset to account for time skipped via `skipTypesetting`.

`Staff_performer` is part of the following context(s) in `\midi`: `ChordGrid` (page 68), `ChordNames` (page 95), `DrumStaff` (page 108), `GregorianTranscriptionLyrics` (page 138), `GregorianTranscriptionStaff` (page 140), `KievanStaff` (page 176), `Lyrics` (page 199), `MensuralStaff` (page 202), `NoteNames` (page 226), `PetrucchiStaff` (page 231), `RhythmicStaff` (page 257), `Staff` (page 287), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.138 `Staff_symbol_engraver`

Create the constellation of five (default) staff lines.

Music types accepted: `staff-span-event` (page 57),

This engraver creates the following layout object(s): `StaffSymbol` (page 632).

`Staff_symbol_engraver` is part of the following context(s) in `\layout`: `ChordGrid` (page 68), `DrumStaff` (page 108), `GregorianTranscriptionStaff` (page 140), `InternalGregorianStaff` (page 163), `KievanStaff` (page 176), `MensuralStaff` (page 202), `PetrucchiStaff` (page 231), `RhythmicStaff` (page 257), `Staff` (page 287), `StandaloneRhythmStaff` (page 326), `TabStaff` (page 341), and `VaticanaStaff` (page 366).

2.2.139 Stanza_number_align_engraver

This engraver ensures that stanza numbers are neatly aligned.

Stanza_number_align_engraver is part of the following context(s) in \layout: ChordGridScore (page 73), Score (page 263), and StandaloneRhythmScore (page 302).

2.2.140 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): StanzaNumber (page 633).

Stanza_number_engraver is part of the following context(s) in \layout: GregorianTranscriptionLyrics (page 138), Lyrics (page 199), and VaticanaLyrics (page 364).

2.2.141 Stem_engraver

Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: tremolo-event (page 58), and tuplet-span-event (page 59),

Properties (read)

currentBarLine (graphical (layout) object)

Set to the BarLine that Bar_engraver has created in the current timestep.

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.

This engraver creates the following layout object(s): Flag (page 548), Stem (page 634), StemStub (page 636), and StemTremolo (page 636).

Stem_engraver is part of the following context(s) in \layout: CueVoice (page 98), DrumVoice (page 118), KievanVoice (page 189), MensuralVoice (page 216), PetrucciVoice (page 245), StandaloneRhythmVoice (page 331), TabVoice (page 353), and Voice (page 390).

2.2.142 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 items (clef, key signature, etc.).

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): `SystemStartBar` (page 644), `SystemStartBrace` (page 645), `SystemStartBracket` (page 645), and `SystemStartSquare` (page 646).

`System_start_delimiter_engraver` is part of the following context(s) in `\layout`: `ChoirStaff` (page 66), `ChordGrid` (page 68), `GrandStaff` (page 136), `PianoStaff` (page 255), `Score` (page 263), `StaffGroup` (page 300), and `StandaloneRhythmScore` (page 302).

2.2.143 `Tab_note_heads_engraver`

Generate one or more tablature note heads from event of type `NoteEvent`.

Music types accepted: `fingering-event` (page 51), `note-event` (page 54), and `string-number-event` (page 58),

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 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): `TabNoteHead` (page 647).

`Tab_note_heads_engraver` is part of the following context(s) in `\layout`: `TabVoice` (page 353).

2.2.144 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): `StaffSymbol` (page 632).

`Tab_staff_symbol_engraver` is part of the following context(s) in `\layout`: `TabStaff` (page 341).

2.2.145 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) in `\layout`: `TabVoice` (page 353).

2.2.146 Tempo_performer

Properties (read)

`tempoWholesPerMinute` (moment)

The tempo in whole notes per minute.

`Tempo_performer` is part of the following context(s) in `\midi`: `ChordGridScore` (page 73), and `Score` (page 263).

2.2.147 Text_engraver

Create text scripts.

Music types accepted: `text-script-event` (page 58),

This engraver creates the following layout object(s): `TextScript` (page 651).

`Text_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `Dynamics` (page 127), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.148 Text_mark_engraver

Engraves arbitrary textual marks.

Music types accepted: `text-mark-event` (page 58),

Properties (read)

`stavesFound` (list of grobs)

A list of all staff-symbols found.

This engraver creates the following layout object(s): `TextMark` (page 649).

`Text_mark_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.149 Text_spanner_engraver

Create text spanner from an event.

Music types accepted: `text-span-event` (page 58),

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): `TextSpanner` (page 653).

`Text_spanner_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `Dynamics` (page 127), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), and `Voice` (page 390).

2.2.150 Tie_engraver

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 58),

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): `Tie` (page 654), and `TieColumn` (page 656).

`Tie_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `NoteNames` (page 226), `NullVoice` (page 228), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.151 Tie_performer

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 58),

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 part of the following context(s) in `\midi`: `ChordNames` (page 95), `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `NullVoice` (page 228), `PetrucchiVoice` (page 245), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.152 Time_signature_engraver

Create a Section 3.1.147 [TimeSignature], page 657, whenever timeSignatureFraction changes.

Music types accepted: time-signature-event (page 58),

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): TimeSignature (page 657).

Time_signature_engraver is part of the following context(s) in \layout: DrumStaff (page 108), InternalGregorianStaff (page 163), MensuralStaff (page 202), PetrucciStaff (page 231), RhythmicStaff (page 257), Staff (page 287), and TabStaff (page 341).

2.2.153 Time_signature_performer

Creates a MIDI time signature whenever timeSignatureFraction changes or a \time command is issued.

Music types accepted: time-signature-event (page 58),

Properties (read)

timeSignatureFraction (fraction, as pair)
A pair of numbers, signifying the time signature. For example, '(4 . 4) is a 4/4 time signature.

Time_signature_performer is part of the following context(s) in \midi: ChordGridScore (page 73), and Score (page 263).

2.2.154 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.

Music types accepted: alternative-event (page 49), bar-event (page 49), and fine-event (page 51),

Properties (read)

alternativeNumberingStyle (symbol)
The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to numbers to reset the bar number at each alternative, or set to numbers-with-letters to reset and also include letter suffixes.

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 incremented at every bar line.

`internalBarNumber` (integer)

Contains the current barnumber. 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)

`alternativeNumber` (non-negative, exact integer)

When set, the index of the current `\alternative` element, starting from one. Not set outside of alternatives. Note the distinction from volta number: an alternative may pertain to multiple volte.

`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 incremented at every bar line.

`internalBarNumber` (integer)

Contains the current barnumber. 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.

`measureStartNow` (boolean)

True at the beginning of a measure.

`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) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302); in `\midi`: `ChordGridScore` (page 73), and `Score` (page 263).

2.2.155 `Trill_spanner_engraver`

Create trill spanners.

Music types accepted: `trill-span-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`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): `TrillSpanner` (page 662).

`Trill_spanner_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.156 `Tuplet_engraver`

Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 59),

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): `TupletBracket` (page 664), and `TupletNumber` (page 665).

`Tuplet_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 98), `DrumVoice` (page 118), `GregorianTranscriptionVoice` (page 153), `KievanVoice` (page 189), `MensuralVoice` (page 216), `PetrucchiVoice` (page 245), `StandaloneRhythmVoice` (page 331), `TabVoice` (page 353), `VaticanaVoice` (page 380), and `Voice` (page 390).

2.2.157 `Tweak_engraver`

Read the tweaks property from the originating event, and set properties.

`Tweak_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

2.2.158 `Vaticana_ligature_engraver`

Handle ligatures by glueing special ligature heads together.

Music types accepted: `ligature-event` (page 52), and `pes-or-flexa-event` (page 55),

This engraver creates the following layout object(s): `DotColumn` (page 531), and `VaticanaLigature` (page 669).

`Vaticana_ligature_engraver` is part of the following context(s) in `\layout`: `VaticanaVoice` (page 380).

2.2.159 `Vertical_align_engraver`

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): `StaffGrouper` (page 630), and `VerticalAlignment` (page 669).

`Vertical_align_engraver` is part of the following context(s) in `\layout`: `ChoirStaff` (page 66), `ChordGridScore` (page 73), `GrandStaff` (page 136), `PianoStaff` (page 255), `Score` (page 263), `StaffGroup` (page 300), and `StandaloneRhythmScore` (page 302).

2.2.160 `Volta_engraver`

Make volta brackets.

Music types accepted: `dal-segno-event` (page 51), `fine-event` (page 51), and `volta-span-event` (page 59),

Properties (read)

`currentCommandColumn` (graphical (layout) object)

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

`repeatCommands` (list)

A list of commands related to volta-style repeats. In general, each element is a list, `'(command args...)`, but a command with no arguments may be abbreviated to a symbol; e.g., `'((start-repeat))` may be given as `'(start-repeat)`.

`end-repeat`

End a repeated section.

`start-repeat`

Start a repeated section.

`volta text`

If `text` is markup, start a volta bracket with that label; if `text` is `#f`, end a volta bracket.

`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): `VoltaBracket` (page 673), and `VoltaBracketSpanner` (page 674).

`Volta_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 73), `Score` (page 263), and `StandaloneRhythmScore` (page 302).

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.

`alignBelowContext` (string)

Where to insert newly created context in vertical alignment.

`alterationGlyphs` (list)

Alist mapping alterations to accidental glyphs. Alterations are given as exact numbers, e.g., $-1/2$ for flat. This applies to all grobs that can print accidentals.

`alternativeNumber` (non-negative, exact integer)

When set, the index of the current `\alternative` element, starting from one. Not set outside of alternatives. Note the distinction from volta number: an alternative may pertain to multiple volte.

`alternativeNumberingStyle` (symbol)

The scheme and style for numbering bars in repeat alternatives. If not set (the default), bar numbers continue through alternatives. Can be set to `numbers` to reset the bar number at each alternative, or set to `numbers-with-letters` to reset and also include letter suffixes.

`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.

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.

`barCheckSynchronize` (boolean)

If true then reset `measurePosition` when finding a bar check.

`barExtraVelocity` (integer)

Extra MIDI velocity added by the ‘Beat_performer’ at the start of each measure.

`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.

`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.

beatExtraVelocity (integer)

Extra MIDI velocity added by the ‘Beat_performer’ at the start of each beat.

beatStructure (list)

List of baseMoments that are combined to make beats.

breathMarkType (symbol)

The type of BreathingSign to create at \breathe.

caesuraType (list)

An alist

```
((bar-line . bar-type)
 (breath . breath-type)
 (scripts . script-type...)
 (underlying-bar-line . bar-type))
```

specifying which breath mark, bar line, and scripts to create at \caesura. All entries are optional.

bar-line has higher priority than a measure bar line and underlying-bar-line has lower priority than a measure bar line.

caesuraTypeTransform (procedure)

An engraver callback taking three arguments and returning an alist of the same kind as caesuraType.

The first argument is the context.

The second argument is the value of caesuraType with an additional entry (*articulations . symbol-list*) identifying the articulations attached to the caesura in the music. If the transform function returns this second argument unmodified, it is as if no transform function were set; the function is free to return a different value. The transform function can remove articulations, but any added articulations are ignored.

The third argument is a symbol-list identifying certain things the engraver has observed. bar-line indicates that the engraver has observed a BarLine at the current moment.

centerBarNumbers (boolean)

Whether to center bar numbers in their measure instead of aligning them on the bar line.

chordChanges (boolean)

Only show changes in chords scheme?

chordNameExceptions (list)

An alist of chord exceptions. Contains (*chord . 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’.

`codaMarkFormatter` (procedure)

A procedure that creates a coda mark (which in conventional *D.S. al Coda* form indicates the start of the alternative endings), taking as arguments the mark sequence number and the context. It should return a markup object.

`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.

`dalSegnoTextFormatter` (procedure)

Format a jump instruction such as *D.S.*

The first argument is the context.

The second argument is the number of times the instruction is performed.

The third argument is a list of three markups: *start-markup*, *end-markup*, and *next-markup*.

If *start-markup* is #f, the form is *da capo*; otherwise the form is *dal segno* and *start-markup* is the sign at the start of the repeated section.

If *end-markup* is not #f, it is either the sign at the end of the main body of the repeat, or it is a *Fine* instruction. When it is a *Fine* instruction, *next-markup* is #f.

If *next-markup* is not #f, it is the mark to be jumped to after performing the body of the repeat, e.g., Coda.

`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.’.

`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.

`doubleRepeatBarType` (string)

Bar line to insert where the end of one \repeat volta coincides with the start of another.

The default is ‘: . . :’.

`doubleRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the end of one \repeat volta and the beginning of another. The default is ‘: | .S. | :’.

`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: ‘drums-style’, ‘agostini-drums-style’, ‘weinberg-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.

`endAtSkip` (boolean)
End `DurationLine` grob on skip-event

`endRepeatBarType` (string)
Bar line to insert at the end of a `\repeat volta`. The default is `':|. '`.

`endRepeatSegnoBarType` (string)
Bar line to insert where an in-staff segno coincides with the end of a `\repeat volta`. The default is `':|.S'`.

`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.

`figuredBassLargeNumberAlignment` (number)
Horizontal alignment to use for numbers in figured bass that contain more than a single digit.

`figuredBassPlusDirection` (direction)
Where to put plus signs relative to the main figure.

`figuredBassPlusStrokedAlist` (list)
An alist mapping figured bass digits to glyphs. The default is mapping numbers 2, 4, 5, 6, 7, and 9 to the six glyphs `figbass.*plus` and `figbass.*stroked`, respectively.

`finalFineTextVisibility` (boolean)
Whether `\fine` at the written end of the music should create a *Fine* instruction.

`fineBarType` (string)
Bar line to insert at `\fine`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `':|. '`.

`fineSegnoBarType` (string)
Bar line to insert where an in-staff segno coincides with `\fine`. The default is `':|.S'`.

`fineStartRepeatSegnoBarType` (string)
Bar line to insert where an in-staff segno coincides with `\fine` and the start of a `\repeat volta`. The default is `':|.S.|: '`.

`fineText` (markup)

The text to print at `\fine`.

`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.

`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, except if explicitly requested by the user.

`forbidBreakBetweenBarLines` (boolean)

If set to true, `Bar_engraver` forbids line breaks where there is no bar line.

`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) (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.

`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.

This property is deprecated

instrumentEqualizer (procedure)

A function taking a string (instrument name), and returning a (*min* . *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 barnumber. 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)

A list of pairs that defines in what order alterations should be printed. The format of an entry is (*step* . *alter*), where *step* is a number from 0 to 6 and *alter* from -1 (double flat) to 1 (double sharp), with exact rationals for alterations in between, e.g., 1/2 for sharp.

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)).

lyricMelismaAlignment (number)

Alignment to use for a melisma syllable.

lyricRepeatCountFormatter (procedure)

A procedure taking as arguments the context and the numeric repeat count. It should return the formatted repeat count as markup. If it does not return markup, no grob is created.

magnifyStaffValue (positive number)

The most recent value set with \magnifyStaff.

majorSevenSymbol (markup)

How should the major 7th be formatted in a chord name?

maximumFretStretch (number)

Don't allocate frets further than this from specified frets.

measureBarType (string)

Bar line to insert at a measure boundary.

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.

measureStartNow (boolean)

True at the beginning of a measure.

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 where this is set. In addition to suppressing the printed accidental, this option removes any effect the note would have had on accidentals in other voices.

`ottavaStartNow` (boolean)
 Is an ottava starting in this time step?

`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 next rehearsal mark to print.

rehearsalMarkFormatter (procedure)

A procedure taking as arguments the context and the sequence number of the rehearsal mark. It should return the formatted mark as a markup object.

repeatCommands (list)

A list of commands related to volta-style repeats. In general, each element is a list, '(*command args...*)', but a command with no arguments may be abbreviated to a symbol; e.g., '((start-repeat))' may be given as '(start-repeat).

end-repeat

End a repeated section.

`start-repeat`
Start a repeated section.

`volta text`
If *text* is markup, start a volta bracket with that label; if *text* is #f, end a volta bracket.

`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.

`sectionBarType` (string)
Bar line to insert at `\section`. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is '| |'.

`segnoBarType` (string)
Bar line to insert at an in-staff segno. The default is 'S'.

`segnoMarkFormatter` (procedure)
A procedure that creates a segno (which conventionally indicates the start of a repeated section), taking as arguments the mark sequence number and the context. It should return a markup object.

`segnoStyle` (symbol)
A symbol that indicates how to print a segno: `bar-line` or `mark`.

`shapeNoteStyles` (vector)
Vector of symbols, listing style for each note head relative to the tonic (q.v.) 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.

`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.

`squashedPosition` (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.

`startAtNoteColumn` (boolean)

Start DurationLine grob at entire NoteColumn.

`startAtSkip` (boolean)

Start DurationLine grob at skip-event.

`startRepeatBarType` (string)

Bar line to insert at the start of a \repeat volta. The default is ‘. | :’.

`startRepeatSegnoBarType` (string)

Bar line to insert where an in-staff segno coincides with the start of a \repeat volta. The default is ‘S. | :’.

`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 `fingeringOrientations`.

`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 $2\frac{1}{2}$

`suspendMelodyDecisions` (boolean)

When using the `Melody_engraver`, stop changing orientation of stems based on the melody when this is set to true.

`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 }
}
```

`underlyingRepeatBarType` (string)

Bar line to insert at points of repetition or departure where no bar line would normally appear, for example at the end of a system broken in mid measure where the next system begins with a segno. Where there is also a repeat bar line, the repeat bar line takes precedence and this value is appended to it as an annotation. The default is `'||'`.

`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)

The current bar line type, or `'()` if there is no bar line. Setting this explicitly in user code is deprecated. Use `\bar` or related commands to set it.

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.

`breathMarkDefinitions` (list)

The description of breath marks. This is used by the `Breathing_sign_engraver`. See `scm/breath.scm` for more information.

`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.).

`codaMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a coda mark appears: not set during the first timestep, 0 up to the first coda mark, 1 from the first to the second, 2 from the second to the third, etc.

`currentBarLine` (graphical (layout) object)

Set to the `BarLine` that `Bar_engraver` has created in the current timestep.

`currentChordCause` (stream event)

Event cause of the chord that should be created in this time step (if any).

`currentChordText` (markup)

In contexts printing chord names, this is at any point of time the markup that will be put in the chord name.

`currentCommandColumn` (graphical (layout) object)

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

`currentMusicalColumn` (graphical (layout) object)

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

`currentPerformanceMarkEvent` (stream event)

The coda, section, or segno mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`currentRehearsalMarkEvent` (stream event)

The ad-hoc or rehearsal mark event selected by `Mark_tracking_translator` for engraving by `Mark_engraver`.

`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.

`forceBreak` (boolean)

Set to `#t` when an event forcing a line break was heard.

`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 `currentCommandColumn` 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.

`midiSkipOffset` (moment)

This is the accrued MIDI offset to account for time skipped via `skipTypesetting`.

`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.

`segnoMarkCount` (non-negative, exact integer)

Updated at the end of each timestep in which a segno appears: not set during the first timestep, 0 up to the first segno, 1 from the first to the second segno, 2 from the second to the third segno, etc.

`slurMelismaBusy` (boolean)

Signal if a slur is present.

`stavesFound` (list of grobs)

A list of all staff-symbols found.

`stringFretFingerList` (list)

A list containing three entries. In `TabVoice` and `FretBoards` they determine the string, fret and finger to use

`tieMelismaBusy` (boolean)

Signal whether a tie is present.

3 Backend

3.1 All layout objects

3.1.1 Accidental

An accidental. Horizontal padding and configuration between accidentals is controlled by the `AccidentalPlacement` (page 477), `grob`.

Accidental objects are created by: `Accidental_engraver` (page 401).

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::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.

`horizontal-skylines` (pair of skylines):

`#<unpure-pure-container #<procedure ly:accidental-interface::horizontal-skylines (_)>>`

Two skylines, one to the left and one to the right of this grob.

`stencil` (stencil):

`ly:accidental-interface::print`

The symbol to print.

`vertical-skylines` (pair of skylines):

`#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-stencil (_)> #<procedure ly:grob::pure-simple-vertical-skylines-from-extents (_ _)>>`

Two skylines, one above and one below this grob.

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 #<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): *accidental-interface* (page 676), *accidental-switch-interface* (page 678), *font-interface* (page 700), *grob-interface* (page 706), *inline-accidental-interface* (page 712), and *item-interface* (page 714).

This object is of class *Item* (characterized by *item-interface* (page 714)).

3.1.2 AccidentalCautionary

A cautionary accidental, normally enclosed in parentheses.

AccidentalCautionary objects are created by: *Accidental_engraver* (page 401).

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::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.

horizontal-skylines (pair of skylines):

#<unpure-pure-container #<procedure ly:accidental-
interface::horizontal-skylines (_)> >

Two skylines, one to the left and one to the right of this grob.

`parenthesized (boolean):`
`#t`
 Parenthesize this grob.

`stencil (stencil):`
`ly:accidental-interface::print`
 The symbol to print.

`vertical-skylines (pair of skylines):`
`#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-stencil (_)> #<procedure ly:grob::pure-simple-vertical-skylines-from-extents (_ _)>>`
 Two skylines, one above and one below this grob.

`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 #<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): `accidental-interface` (page 676), `accidental-switch-interface` (page 678), `font-interface` (page 700), `grob-interface` (page 706), `inline-accidental-interface` (page 712), and `item-interface` (page 714).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.3 AccidentalPlacement

In groups of `Accidental` (page 475), grobs, this auxiliary grob controls their horizontal padding and configuration (which ones are placed more to left or to the right).

`AccidentalPlacement` objects are created by: `Accidental_engraver` (page 401), and `Ambitus_engraver` (page 402).

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): `accidental-placement-interface` (page 677), `grob-interface` (page 706), and `item-interface` (page 714).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.4 AccidentalSuggestion

An annotational accidental as used in *musica ficta*. Normally positioned above a note.

AccidentalSuggestion objects are created by: `Accidental_engraver` (page 401).

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 (string):

accidental-interface::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.

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 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):`

`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 #<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 #<procedure ly:side-position-interface::y-
aligned-side (_ #:optional _)> #<procedure ly:side-position-
interface::pure-y-aligned-side (_ _ _ #:optional _)>>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `accidental-interface` (page 676), `accidental-suggestion-interface` (page 678), `accidental-switch-interface` (page 678), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `script-interface` (page 736), `self-alignment-interface` (page 738), and `side-position-interface` (page 740).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.5 Ambitus

An ambitus, giving the range of pitches of a voice or instrument. It aligns `AmbitusAccidental` (page 481), `AmbitusLine` (page 482), and `AmbitusNoteHead` (page 482), horizontally and defines the horizontal spacing from the ambitus to other items.

Ambitus objects are created by: `Ambitus_engraver` (page 402).

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 #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 (alist, with symbols as keys):`
`'((cue-end-clef extra-space . 0.5)`
`(clef extra-space . 1.15)`
`(cue-clef extra-space . 0.5)`
`(key-signature extra-space . 1.15)`
`(signum-repetitionis 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 `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):

`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 #<procedure ly:axis-group-interface::height (_)> #<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): `ambitus-interface` (page 679), `axis-group-interface` (page 680), `break-aligned-interface` (page 689), `grob-interface` (page 706), and `item-interface` (page 714).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.6 AmbitusAccidental

An accidental in an `Ambitus` (page 479).

`AmbitusAccidental` objects are created by: `Ambitus_engraver` (page 402).

Standard settings:

glyph-name (string):

`accidental-interface::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.

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 #<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): `accidental-interface` (page 676), `accidental-switch-interface` (page 678), `break-aligned-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), and `item-interface` (page 714).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.7 AmbitusLine

The vertical line in an `Ambitus` (page 479).

`AmbitusLine` objects are created by: `Ambitus_engraver` (page 402).

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 `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): `ambitus-interface` (page 679), `font-interface` (page 700), `grob-interface` (page 706), and `item-interface` (page 714).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.8 AmbitusNoteHead

A note head in an `Ambitus` (page 479).

`AmbitusNoteHead` objects are created by: `Ambitus_engraver` (page 402).

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, *glyph-name* represents a processed form of 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 #<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 #<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): *ambitus-interface* (page 679), *font-interface* (page 700), *grob-interface* (page 706), *item-interface* (page 714), *ledgered-interface* (page 717), *note-head-interface* (page 729), and *staff-symbol-referencer-interface* (page 751).

This object is of class *Item* (characterized by *item-interface* (page 714)).

3.1.9 Arpeggio

An arpeggio line (normally a vertical wiggle).

Arpeggio objects are created by: *Arpeggio_engraver* (page 403), and *Span_arpeggio_engraver* (page 448).

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 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*).

`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 (*start* . *end*), where *start* and *end* are vertical positions 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 *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 #<procedure ly:grob::stencil-height (>

#<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 #<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): `arpeggio-interface` (page 679), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `side-position-interface` (page 740), and `staff-symbol-referencer-interface` (page 751).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.10 BalloonText

A balloon text with a pointing line to visually mark and annotate another grob.

BalloonText objects are created by: `Balloon_engraver` (page 404).

Standard settings:

`after-line-breaking` (boolean):

`ly:balloon-interface::remove-irrelevant-spanner`

Dummy property, used to trigger callback for `after-line-breaking`.

`annotation-balloon` (boolean):

`#t`

Print the balloon around an annotation.

`annotation-line` (boolean):

`#t`

Print the line from an annotation to the grob that it annotates.

`break-visibility` (vector):

`#<procedure 7f3394312420 at ice-9/eval.scm:333:13 (a)>`

A vector of 3 booleans, `#(end-of-line unbroken begin-of-line)`. `#t` means visible, `#f` means killed.

`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)`.

`stencil` (stencil):

`ly:balloon-interface::print`

The symbol to print.

`text` (markup):

`#<procedure 7f3394318c80 at ice-9/eval.scm:333:13 (a)>`

Text markup. See Section “Formatting text” in *Notation Reference*.

`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 #<procedure ly:grob::vertical-skylines-from-stencil (>> #<procedure ly:grob::pure-simple-vertical-skylines-from-extents (>>>`

Two skylines, one above and one below this grob.

X-extent (pair of numbers):

ly:balloon-interface::width

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

X-offset (number):

#<procedure 7f3394318860 at ice-9/eval.scm:333:13 (a)>

The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):

#<unpure-pure-container #<procedure ly:grob::stencil-height (_)>

#<procedure ly:balloon-interface::pure-height (_ _ _)>>

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

Y-offset (number):

#<procedure 7f3394318680 at ice-9/eval.scm:333:13 (a)>

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): accidental-switch-interface (page 678), balloon-interface (page 682), font-interface (page 700), grob-interface (page 706), sticky-grob-interface (page 754), and text-interface (page 757).

This object can be of either of the following classes: Item (characterized by item-interface) or Spanner (characterized by spanner-interface). It supports the following interfaces conditionally depending on the class: item-interface (page 714), and spanner-interface (page 748).

3.1.11 BarLine

A bar line.

BarLine objects are created by: Bar_engraver (page 404).

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):

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-left` (string):
`#<procedure 7f339431ba40 at ice-9/eval.scm:333:13 (a)>`
 The glyph value to use at the end of the line when the line is broken. `#f` indicates that no glyph should be visible; otherwise the value must be a string.

`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.

`glyph-right` (string):
`#f`
 The glyph value to use at the beginning of the line when the line is broken. `#f` indicates that no glyph should be visible; otherwise the value must be a string.

`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`).

`horizontal-skylines` (pair of skylines):
`#<unpure-pure-container #<procedure ly:grob::horizontal-skylines-from-stencil (>>`
 Two skylines, one to the left and one to the right of this grob.

`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 *not* influenced by changes to `Staff.StaffSymbol.thickness`).

`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`.

`rounded (boolean):`

#f

Decide whether lines should be drawn rounded or not.

`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 *not* influenced by changes to `Staff.StaffSymbol.thickness`).

`space-alist (alist, with symbols as keys):`

```
'((ambitus extra-space . 1.0)
  (time-signature extra-space . 0.75)
  (custos minimum-space . 2.0)
  (clef extra-space . 1.0)
  (key-signature extra-space . 1.0)
  (key-cancellation extra-space . 1.0)
  (first-note fixed-space . 1.3)
  (next-note semi-fixed-space . 0.9)
  (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.

`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 #<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): `bar-line-interface` (page 683), `break-aligned-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), and `pure-from-neighbor-interface` (page 735).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.12 BarNumber

An ordinary bar number. Centered bar numbers are managed separately with `CenteredBarNumber` (page 506), grobs.

`BarNumber` objects are created by: `Bar_number_engraver` (page 406).

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):`

`#<procedure 7f3394322580 at ice-9/eval.scm:333:13 (a)>`

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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _)>>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `bar-number-interface` (page 684), `break-alignable-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.13 BassFigure

A number in figured bass. It can contain an alteration as well.

BassFigure objects are created by: `Figured_bass_engraver` (page 421).

Standard settings:

`font-features (list):`

`'("tnum" "cv47" "ss01")`

Opentype features.

`stencil (stencil):`

`ly:text-interface::print`

The symbol to print.

`Y-extent (pair of numbers):`

`#<unpure-pure-container #<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): `accidental-switch-interface` (page 678), `bass-figure-interface` (page 684), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `rhythmic-grob-interface` (page 736), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.14 BassFigureAlignment

An auxiliary grob to stack several `BassFigureLine` (page 494), grobs vertically.

`BassFigureAlignment` objects are created by: `Figured_bass_engraver` (page 421).

Standard settings:

`axes` (list):

`'(1)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`padding` (dimension, in staff space):

`-inf.0`

Add this much extra space between objects that are next to each other.

`stacking-dir` (direction):

`-1`

Stack objects in which direction?

`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):

`#<unpure-pure-container #<procedure ly:axis-group-interface::height (_)> #<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): `align-interface` (page 678), `axis-group-interface` (page 680), `bass-figure-alignment-interface` (page 684), `grob-interface` (page 706), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.15 BassFigureAlignmentPositioning

If `figured bass` is used in the `Staff` (page 287), context, this auxiliary grob groups all of the `figured bass` notation and computes an offset from the staff via side-positioning.

`BassFigureAlignmentPositioning` objects are created by: `Figured_bass_position_engraver` (page 422).

Standard settings:

`add-stem-support` (boolean):

`#t`

If set, the `Stem` object is included in this script's support.

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 #<procedure ly:axis-group-interface::height
(_)> #<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 #<procedure ly:side-position-interface::y-
aligned-side (_ #:optional _)> #<procedure ly:side-position-
interface::pure-y-aligned-side (_ _ _ #:optional _)> >

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): axis-group-interface (page 680), grob-interface (page 706), outside-staff-interface (page 732), side-position-interface (page 740), and spanner-interface (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.16 BassFigureBracket

Brackets around a figured bass (or elements of it).

BassFigureBracket objects are created by: `Figured_bass_engraver` (page 421).

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): enclosing-bracket-interface (page 697), grob-interface (page 706), and item-interface (page 714).

This object is of class Item (characterized by item-interface (page 714)).

3.1.17 BassFigureContinuation

A horizontal line to indicate that a number of a previous figured bass is continued in the current figured bass.

BassFigureContinuation objects are created by: Figured_bass_engraver (page 421).

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): figured-bass-continuation-interface (page 698), grob-interface (page 706), and spanner-interface (page 748).

This object is of class Spanner (characterized by spanner-interface (page 748)).

3.1.18 BassFigureLine

An auxiliary grob providing a baseline for bass figures that should be aligned vertically.

BassFigureLine objects are created by: Figured_bass_engraver (page 421).

Standard settings:

axes (list):

'(1)

List of axis numbers. In the case of alignment grobs, this should contain only one number.

staff-staff-spacing (alist, with symbols as keys):

'((minimum-distance . 1.5) (padding . 0.1))

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).

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):

`#<unpure-pure-container #<procedure ly:axis-group-interface::height (_)> #<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): `axis-group-interface` (page 680), `grob-interface` (page 706), `outside-staff-axis-group-interface` (page 731), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.19 Beam

A beam.

Beam objects are created by: `Auto_beam_engraver` (page 403), `Beam_engraver` (page 408), `Chord_tremolo_engraver` (page 413), `Grace_auto_beam_engraver` (page 425), and `Grace_beam_engraver` (page 425).

Standard settings:

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.

beam-thickness (dimension, in staff space):

0.48

Beam thickness, measured in staff-space units.

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.

beaming (pair):

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.

clip-edges (boolean):

#t

Allow outward pointing beamlets at the edges of beams?

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 (alist, with symbols as keys):

```
'((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))
```

Alist 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 (*start* . *end*), where *start* and *end* are vertical positions 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 7f339432d540 at ice-9/eval.scm:333:13 (a)>

This makes the grob invisible.

vertical-skylines (pair of skylines):

#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-stencil (> #<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): *beam-interface* (page 684), *grob-interface* (page 706), *spanner-interface* (page 748), *staff-symbol-referencer-interface* (page 751), and *unbreakable-spanner-interface* (page 764).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.20 BendAfter

A grob for displaying *falls* and *doits*.

BendAfter objects are created by: *Bend_engraver* (page 410).

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 between 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): *bend-after-interface* (page 687), *grob-interface* (page 706), and *spanner-interface* (page 748).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.21 BendSpanner

A string bending as used in tablature notation.

BendSpanner objects are created by: *Bend_spanner_engraver* (page 410).

Standard settings:

```
avoid-slur (symbol):
  'ignore
```

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):
  3
```

Distance between base lines of multiple lines of text.

```
before-line-breaking (boolean):
  bend::target-cautionary
```

Dummy property, used to trigger a callback function.

```
details (alist, with symbols as keys):
```

```
'((arrow-stencil
  .
  #<procedure bend::arrow-head-stencil (a b c d e)>)
 (curvature-factor . 0.35)
 (bend-arrowhead-height . 1.25)
 (bend-arrowhead-width . 0.8)
 (bend-amount-strings
  (quarter . " $\frac{1}{4}$ ")
  (half . " $\frac{1}{2}$ ")
  (three-quarter . " $\frac{3}{4}$ ")
  (full . #f))
 (curve-x-padding-line-end . 0.5)
 (curve-y-padding-line-end . 1)
 (dashed-line-settings 0.4 0.4 0))
```

```
(head-text-break-visibility . #(#f #t #t))
(horizontal-left-padding . 0.1)
(successive-level . 1)
(target-visibility . #f)
(vertical-padding . 0.2)
(y-distance-from-tabstaff-to-arrow-tip . 2.75))
```

Alist 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):

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):

'latin1

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-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.

padding (dimension, in staff space):

0.15

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.

spanner-id (index or symbol):

""

An identifier to distinguish concurrent spanners.

stencil (stencil):

`bend-spanner::print`

The symbol to print.

style (symbol):

'()

This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

text (markup):

#f

Text markup. See Section “Formatting text” in *Notation Reference*.

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*).

vertical-skylines (pair of skylines):

```
#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-
stencil (_) > #<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-offset (number):

0

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): *bend-interface* (page 687), *font-interface* (page 700), *grob-interface* (page 706), *line-spanner-interface* (page 719), *outside-staff-interface* (page 732), *spanner-interface* (page 748), *text-interface* (page 757), and *text-script-interface* (page 758).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.22 BreakAlignGroup

An auxiliary grob to group several breakable items of the same type (clefs, time signatures, etc.) across staves so that they will be aligned horizontally. See also *BreakAlignment* (page 501).

BreakAlignGroup objects are created by: *Break_align_engraver* (page 411).

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): *axis-group-interface* (page 680), *break-aligned-interface* (page 689), *grob-interface* (page 706), and *item-interface* (page 714).

This object is of class *Item* (characterized by *item-interface* (page 714)).

3.1.23 BreakAlignment

An auxiliary grob that manages the horizontal ordering of *BreakAlignGroup* (page 500), grobs within a *NonMusicalPaperColumn* (page 593), grob (for example, whether the time signature follows or precedes a bar line).

BreakAlignment objects are created by: *Break_align_engraver* (page 411).

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
  staff-ellipsis
  cue-end-clef
  ambitus
  breathing-sign
  signum-repetitionis
  clef
  cue-clef
  staff-bar
  key-cancellation
  key-signature
  time-signature
  custos)
(left-edge
  staff-ellipsis
  cue-end-clef
  ambitus
  breathing-sign
  signum-repetitionis
  clef
  cue-clef
  staff-bar
  key-cancellation
  key-signature
  time-signature))
```

```

    custos)
(left-edge
 staff-ellipsis
 ambitus
 breathing-sign
 signum-repetitionis
 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:

```

\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): *axis-group-interface* (page 680), *break-alignment-interface* (page 690), *grob-interface* (page 706), and *item-interface* (page 714).

This object is of class *Item* (characterized by *item-interface* (page 714)).

3.1.24 BreathingSign

A breathing sign.

BreathingSign objects are created by: *Breathing_sign_engraver* (page 411), and *Caesura_engraver* (page 411).

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.

`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.

`non-musical` (boolean):

`##t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (alist, with symbols as keys):

```
'((ambitus extra-space . 2.0)
  (custos minimum-space . 1.0)
  (key-signature minimum-space . 1.5)
  (time-signature minimum-space . 1.5)
  (signum-repetitionis 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.

thickness (*number*):

1.9

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 #<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 #<procedure 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): *break-aligned-interface* (page 689), *breathing-sign-interface* (page 691), *font-interface* (page 700), *grob-interface* (page 706), *item-interface* (page 714), *outside-staff-interface* (page 732), and *text-interface* (page 757).

This object is of class *Item* (characterized by *item-interface* (page 714)).

3.1.25 CaesuraScript

A script for \caesura, e.g., an outside-staff comma or a fermata over a bar line.

CaesuraScript objects are created by: `Caesura_engraver` (page 411).

Standard settings:

`before-line-breaking` (boolean):

`caesura-script-interface::before-line-breaking`

Dummy property, used to trigger a callback function.

`break-visibility` (vector):

`##(##t ##t ##f)`

A vector of 3 booleans, `##(end-of-line unbroken begin-of-line)`. `##t` means visible, `##f` means killed.

`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`.

`non-musical` (boolean):

`##t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`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):
  #<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-
  stencil (>>
  Two skylines, one above and one below this grob.

X-offset (number):
  script-interface::calc-x-offset
  The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
  #<unpure-pure-container #<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 #<procedure ly:side-position-interface::y-
  aligned-side (_ #:optional _)> #<procedure ly:side-position-
  interface::pure-y-aligned-side (_ _ #:optional _)>
  The vertical amount that this object is moved relative to its Y-parent.

```

This object supports the following interface(s): `caesura-script-interface` (page 692), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `script-interface` (page 736), `self-alignment-interface` (page 738), and `side-position-interface` (page 740).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.26 CenteredBarNumber

A centered bar number; see also `CenteredBarNumberLineSpanner` (page 507). Ordinary bar numbers are managed with `BarNumber` (page 489), grobs.

`CenteredBarNumber` objects are created by: `Bar_number_engraver` (page 406).

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).

font-family (symbol):
  'roman

  The font family is the broadest category for selecting text fonts. Options include:
  sans, roman.

font-size (number):
  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.

```

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.

X-offset (number):

centered-spanner-interface::calc-x-offset

The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): bar-number-interface (page 684), centered-bar-number-interface (page 692), centered-spanner-interface (page 692), font-interface (page 700), grob-interface (page 706), spanner-interface (page 748), and text-interface (page 757).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.27 CenteredBarNumberLineSpanner

An auxiliary grob providing a vertical baseline to align `CenteredBarNumber` (page 506), grobs.

`CenteredBarNumberLineSpanner` objects are created by: `Centered_bar_number_align_engraver` (page 412).

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.

outside-staff-priority (number):

1200

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):

4

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):

```
#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-
element-stencils (> #<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 #<procedure ly:axis-group-interface::height
(> #<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 #<procedure ly:side-position-interface::y-
aligned-side ( _ #:optional _ )> #<procedure ly:side-position-
interface::pure-y-aligned-side ( _ _ #:optional _ )> >
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `axis-group-interface` (page 680), `bar-number-interface` (page 684), `centered-bar-number-line-spanner-interface` (page 692), `grob-interface` (page 706), `outside-staff-interface` (page 732), `side-position-interface` (page 740), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.28 ChordName

A stand-alone chord name. For chord names in chord grids, see `GridChordName` (page 553).

`ChordName` objects are created by: `Chord_name_engraver` (page 412).

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):
 #<unpure-pure-container #<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): `accidental-switch-interface` (page 678), `chord-name-interface` (page 692), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `rhythmic-grob-interface` (page 736), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.29 ChordSquare

In a chord grid, this grob represents one chord square. It helps place `GridChordName` (page 553), grobs, and draws lines to separate them. Note that this grob only draws the diagonal lines in a square. The borders of the square are drawn by `StaffSymbol` (page 632), and `BarLine` (page 486).

ChordSquare objects are created by: `Chord_square_engraver` (page 413).

Standard settings:

```
measure-division-chord-placement-alist (association list (list of pairs)):
  '(((1) (0 . 0))
    ((1/2 1/2) (-0.4 . 0.4) (0.4 . -0.4))
    ((1/2 1/4 1/4)
      (-0.4 . 0.4)
      (0 . -0.65)
      (0.63 . 0))
    ((1/4 1/4 1/2)
      (-0.63 . 0)
      (0 . 0.65)
      (0.4 . -0.4))
    ((1/4 1/4 1/4 1/4)
      (-0.63 . 0)
      (0 . 0.7))
```

```
(0 . -0.65)
(0.63 . 0))
((1/4 3/4) (-0.63 . 0) (0.38 . 0))
((3/4 1/4) (-0.38 . 0) (0.63 . 0)))
```

An alist mapping measure divisions (see the `measure-division` property) to lists of coordinates (number pairs) applied to the chord names of a chord square. Coordinates are normalized between -1 and 1 within the square.

`measure-division-lines-alist` (association list (list of pairs)):

```
'(((1))
 ((1/2 1/2) (-1 -1 1 1))
 ((1/2 1/4 1/4) (-1 -1 1 1) (0 0 1 -1))
 ((1/4 1/4 1/2) (-1 -1 1 1) (-1 1 0 0))
 ((1/4 1/4 1/4 1/4) (-1 -1 1 1) (-1 1 1 -1))
 ((1/4 3/4) (-1 -1 0 0) (-1 1 0 0))
 ((3/4 1/4) (0 0 1 -1) (0 0 1 1)))
```

An alist mapping measure divisions (see the `measure-division` property) to lists of lines to draw in the square, given as 4-element lists: (*x-start y-start x-end y-end*).

`stencil` (stencil):

`chord-square::print`

The symbol to print.

`X-extent` (pair of numbers):

`chord-square::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 #<procedure chord-square::height (a)>>`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `chord-square-interface` (page 692), `grob-interface` (page 706), `line-interface` (page 718), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.30 Clef

A clef. See also `ClefModifier` (page 513), `CueClef` (page 521), and `CueEndClef` (page 524).

Clef objects are created by: `Clef_engraver` (page 413).

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 (alist, with symbols as keys):`

```
'((cue-clef extra-space . 2.0)
  (signum-repetitionis extra-space . 0.7)
  (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 (*stencil*):

```
ly:clef::print
  The symbol to print.
```

vertical-skylines (*pair of skylines*):

```
#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-
stencil (> >
  Two skylines, one above and one below this grob.
```

Y-extent (*pair of numbers*):

```
#<unpure-pure-container #<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 #<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): `break-aligned-interface` (page 689), `clef-interface` (page 693), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `pure-from-neighbor-interface` (page 735), and `staff-symbol-referencer-interface` (page 751).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.31 ClefModifier

A grob that draws the clef modifier (if present), in most cases the digit 8 below or above the clef. See also `Clef` (page 510), `CueClef` (page 521), and `CueEndClef` (page 524).

`ClefModifier` objects are created by: `Clef_engraver` (page 413), and `Cue_clef_engraver` (page 416).

Standard settings:

`break-visibility` (vector):

```
#<procedure 7f3394346140 at ice-9/eval.scm:333:13 (a)>
```

A vector of 3 booleans, `#(end-of-line unbroken begin-of-line)`. `#t` means visible, `#f` means killed.

`clef-alignments` (alist, with symbols as keys):

```
'((G -0.2 . 0.1) (F -0.3 . -0.2) (C 0 . 0))
```

An alist of parent-alignments that should be used for clef modifiers with various clefs

`color` (color):

```
#<procedure 7f3394347e00 at ice-9/eval.scm:333:13 (a)>
```

The color of this grob.

`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.

`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 7f3394347580 at ice-9/eval.scm:333:13 (a)>
This makes the grob invisible.

`vertical-skylines` (pair of skylines):
#<unpure-pure-container #<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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _)>>
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `clef-modifier-interface` (page 693), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.32 ClusterSpanner

A cluster spanner. The envelope shape within the spanner is given by `ClusterSpannerBeacon` (page 515), grobs.

`ClusterSpanner` objects are created by: `Cluster_spanner_engraver` (page 414).

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): `cluster-interface` (page 694), `grob-interface` (page 706), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.33 ClusterSpannerBeacon

An auxiliary grob to specify the minimum and maximum pitch of a `ClusterSpanner` (page 514), grob at a given moment.

`ClusterSpannerBeacon` objects are created by: `Cluster_spanner_engraver` (page 414).

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): `cluster-beacon-interface` (page 694), `grob-interface` (page 706), `item-interface` (page 714), and `rhythmic-grob-interface` (page 736).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.34 CodaMark

A coda mark.

`CodaMark` objects are created by: `Mark_engraver` (page 432).

Standard settings:

after-line-breaking (boolean):

ly:side-position-interface::move-to-extremal-staff

Dummy property, used to trigger callback for after-line-breaking.

baseline-skip (dimension, in staff space):

2

Distance between base lines of multiple lines of text.

break-align-symbols (list):

'(staff-bar key-signature clef)

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):

`##(##t ##t ##f)`

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-padding (number):

0.4

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-priority (number):

1400

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):

0.4

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 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 #<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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ _ #:optional _)>>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-alignable-interface` (page 689), `coda-mark-interface` (page 694), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `mark-interface` (page 722), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.35 CombineTextScript

A grob for printing markup given in the `soloText`, `soloIIText`, and `aDueText` properties if automatic part combining is active.

`CombineTextScript` objects are created by: `Part_combine_engraver` (page 441).

Standard settings:

`avoid-slur (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):

#f

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):

#f

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 #<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 #<procedure ly:side-position-interface::y-
  aligned-side (_ #:optional _)> #<procedure ly:side-position-
  interface::pure-y-aligned-side (_ _ _ #:optional _)>>
  The vertical amount that this object is moved relative to its Y-parent.

```

This object supports the following interface(s): `accidental-switch-interface` (page 678), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), `text-interface` (page 757), and `text-script-interface` (page 758).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.36 ControlPoint

A visual representation of a Bézier control point in ties and slurs.

`ControlPoint` objects are created by: `Show_control_points_engraver` (page 446).

Standard settings:

```

color (color):
  "IndianRed"
  The color of this grob.

horizontal-skylines (pair of skylines):
  #f
  Two skylines, one to the left and one to the right of this grob.

layer (integer):
  3
  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.

stencil (stencil):
  ly:text-interface::print
  The symbol to print.

text (markup):
  '(<procedure draw-circle-markup (a b c d e)>
    0.3
    0.01

```

#t)

Text markup. See Section “Formatting text” in *Notation Reference*.

vertical-skylines (pair of skylines):

#f

Two skylines, one above and one below this grob.

X-extent (pair of numbers):

#f

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

X-offset (number):

#<procedure 7f3394363260 at ice-9/eval.scm:333:13 (a)>

The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):

#f

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):

#<procedure 7f3394366f40 at ice-9/eval.scm:333:13 (a)>

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): control-point-interface (page 694), grob-interface (page 706), sticky-grob-interface (page 754), and text-interface (page 757).

This object can be of either of the following classes: Item (characterized by item-interface) or Spanner (characterized by spanner-interface). It supports the following interfaces conditionally depending on the class: item-interface (page 714), and spanner-interface (page 748).

3.1.37 ControlPolygon

A visual representation of a Bézier control polygon as used in ties and slurs.

ControlPolygon objects are created by: Show_control_points_engraver (page 446).

Standard settings:

color (color):

"BurlyWood"

The color of this grob.

extroversion (number):

0.5

For polygons, how the thickness of the line is spread on each side of the exact polygon with ideal zero thickness. If this is 0, the middle of line is on the polygon. If 1, the line sticks out of the polygon. If -1, the outer side of the line is exactly on the polygon. Other numeric values are interpolated.

filled (boolean):

#f

Whether an object is filled with ink.

horizontal-skylines (pair of skylines):

#f

Two skylines, one to the left and one to the right of this grob.

`layer (integer):`

2

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.

`stencil (stencil):`

`ly:text-interface::print`

The symbol to print.

`text (markup):`

`control-polygon::calc-text`

Text markup. See Section “Formatting text” in *Notation Reference*.

`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):`

`#f`

Two skylines, one above and one below this grob.

`X-extent (pair of numbers):`

`#f`

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

`Y-extent (pair of numbers):`

`#f`

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): `control-polygon-interface` (page 695), `grob-interface` (page 706), `sticky-grob-interface` (page 754), and `text-interface` (page 757).

This object can be of either of the following classes: `Item` (characterized by `item-interface`) or `Spanner` (characterized by `spanner-interface`). It supports the following interfaces conditionally depending on the class: `item-interface` (page 714), and `spanner-interface` (page 748).

3.1.38 CueClef

A clef starting a cue. See also `Clef` (page 510), `ClefModifier` (page 513), and `CueEndClef` (page 524).

CueClef objects are created by: `Cue_clef_engraver` (page 416).

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`.

`space-alist` (alist, with symbols as keys):

`'((signum-repetitionis minimum-space . 2.7)`

```
(staff-bar minimum-space . 2.7)
(key-cancellation minimum-space . 3.5)
(key-signature minimum-space . 3.5)
(time-signature minimum-space . 4.2)
(custos minimum-space . 0.0)
(first-note minimum-fixed-space . 3.0)
(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.

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-
  stencil (>>
  Two skylines, one above and one below this grob.

Y-extent (pair of numbers):
  #<unpure-pure-container #<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 #<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): `break-aligned-interface` (page 689), `clef-interface` (page 693), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `pure-from-neighbor-interface` (page 735), and `staff-symbol-referencer-interface` (page 751).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.39 CueEndClef

A clef ending a cue. See also `Clef` (page 510), `ClefModifier` (page 513), and `CueClef` (page 521).

`CueEndClef` objects are created by: `Cue_clef_engraver` (page 416).

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` (alist, with symbols as keys):

```
'((clef extra-space . 0.7)
  (cue-clef extra-space . 0.7)
  (signum-repetitionis 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):`
`#<unpure-pure-container #<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 #<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): `break-aligned-interface` (page 689), `clef-interface` (page 693), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `pure-from-neighbor-interface` (page 735), and `staff-symbol-referencer-interface` (page 751).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.40 Custos

A custos, mainly used in older notation like Gregorian chant.

Custos objects are created by: `Custos_engraver` (page 417).

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 ##f`

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` (alist, with symbols as keys):
`'((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 #<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): `break-aligned-interface` (page 689), `custos-interface` (page 695), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), and `staff-symbol-referencer-interface` (page 751).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.41 Divisio

A structural divider in a chant, often calling for a breath or caesura.

Divisio objects are created by: `Divisio_engraver` (page 417).

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-anchor-alignment (number):`

0

Read by `ly:break-aligned-interface::calc-extent-aligned-anchor` for aligning an anchor to a grob's extent.

`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.

`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-height` (pair of numbers):

`item::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):

`'(-1.0 . 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)`.

`non-musical` (boolean):

`##t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (alist, with symbols as keys):

```
'((ambitus extra-space . 1.0)
  (time-signature extra-space . 0.75)
  (custos minimum-space . 2.0)
  (clef extra-space . 1.0)
  (key-signature extra-space . 1.0)
  (key-cancellation extra-space . 1.0)
  (first-note fixed-space . 1.3)
  (next-note semi-fixed-space . 0.9)
  (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.

`stencil (stencil):`

`ly:text-interface::print`

The symbol to print.

`thickness (number):`

1.9

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 #<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 #<procedure 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): `break-aligned-interface` (page 689), `breathing-sign-interface` (page 691), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.42 DotColumn

An auxiliary grob to align stacked Dots (page 531), grobs of dotted notes and chords.

`DotColumn` objects are created by: `Dot_column_engraver` (page 418), and `Vaticana_ligature_engraver` (page 456).

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.

`padding` (dimension, in staff space):

`dot-column-interface::pad-by-one-dot-width`

Add this much extra space between objects that are next to each other.

`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): `axis-group-interface` (page 680), `dot-column-interface` (page 695), `grob-interface` (page 706), and `item-interface` (page 714).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.43 Dots

The dot(s) of a dotted note. See also `DotColumn` (page 531).

Dots objects are created by: `Dots_engraver` (page 418).

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)`.

`glyph-name` (string):

`dots::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.

`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 #<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): `dots-interface` (page 696), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), and `staff-symbol-referencer-interface` (page 751).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.44 DoublePercentRepeat

A double-percent symbol for repeating two bars. See also `DoublePercentRepeatCounter` (page 534), `PercentRepeat` (page 601), `DoubleRepeatSlash` (page 535), and `RepeatSlash` (page 608).

`DoublePercentRepeat` objects are created by: `Double_percent_repeat_engraver` (page 418).

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-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 ##<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): `break-aligned-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), and `percent-repeat-interface` (page 733).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.45 DoublePercentRepeatCounter

A grob to print a counter for DoublePercentRepeat (page 532), grobs.

DoublePercentRepeatCounter objects are created by: Double_percent_repeat_engraver (page 418).

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. Currently, only Lilypond's system fonts (Emmentaler) are using this property. Available values are fetaMusic (Emmentaler), fetaBraces, fetaText (Emmentaler).

font-features (list):

('cv47')

Opentype features.

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.

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: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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _) > #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _) >>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.46 DoubleRepeatSlash

A double-percent symbol for repeating patterns shorter than a single measure, and which contain mixed durations. See also `PercentRepeat` (page 601), `DoublePercentRepeat` (page 532), and `RepeatSlash` (page 608).

`DoubleRepeatSlash` objects are created by: `Slash_repeat_engraver` (page 447).

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-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 `Staff.StaffSymbol.thickness`).

`Y-extent` (`pair of numbers`):

`#<unpure-pure-container #<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): `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `percent-repeat-interface` (page 733), and `rhythmic-grob-interface` (page 736).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.47 DurationLine

A horizontal duration line, continuing rhythmic items (usually note heads).

`DurationLine` objects are created by: `Duration_line_engraver` (page 419).

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`):

2

Arrow length.

`arrow-width` (`number`):

1.5

Arrow width.

`bound-details` (`alist`, with symbols as keys):

```
'((right (attach-dir . -1)
          (end-on-accidental . #t)
          (end-on-arpeggio . #t)
          (padding . 0.4)
          (end-style . #f))
 (right-broken (padding . 0.4) (end-style . #f))
 (left-broken (padding . 0.5))
 (left (attach-dir . 1)
       (padding . -0.3)
       (start-at-dot . #f)))
```

An alist of properties for determining attachments of spanners to edges.

`breakable` (boolean):

`#t`

Allow breaks here.

`details` (alist, with symbols as keys):

```
'((hook-height . 0.34)
  (hook-thickness . #f)
  (hook-direction . 1)
  (extra-dot-padding . 0.5))
```

Alist 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.

`left-bound-info` (alist, with symbols as keys):

`ly:horizontal-line-spanner::calc-left-bound-info`

An alist of properties for determining attachments of spanners to edges.

`minimum-length` (dimension, in staff space):

2

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):

6

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.

`right-bound-info` (alist, with symbols as keys):

`ly:horizontal-line-spanner::calc-right-bound-info`

An alist of properties for determining attachments of spanners to edges.

`springs-and-rods` (boolean):

`ly:spanner::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):

`duration-line::print`

The symbol to print.

`style` (symbol):

`'beam`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number):

4

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):

#f

If true, the spanner will stop at the bar line just before it would otherwise stop.

vertical-skylines (pair of skylines):

```
#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-
stencil (> #<procedure ly:grob::pure-simple-vertical-skylines-from-
extents (> >
```

Two skylines, one above and one below this grob.

Y-offset (number):

0

The vertical amount that this object is moved relative to its Y-parent.

zigzag-length (dimension, in staff space):

1

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):

1

The width of one zigzag squiggle. This number is adjusted slightly so that the spanner line can be constructed from a whole number of squiggles.

This object supports the following interface(s): `duration-line-interface` (page 696), `font-interface` (page 700), `grob-interface` (page 706), `horizontal-line-spanner-interface` (page 712), `line-interface` (page 718), `line-spanner-interface` (page 719), `spanner-interface` (page 748), and `unbreakable-spanner-interface` (page 764).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.48 DynamicLineSpanner

An auxiliary grob providing a vertical baseline to align successive dynamic grobs (`DynamicText` (page 539), `DynamicTextSpanner` (page 541), and `Hairpin` (page 555)) within a staff.

`DynamicLineSpanner` objects are created by: `Dynamic_align_engraver` (page 420).

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):

1.2

Minimum distance that the victim should move (after padding).

outside-staff-priority (number):

250

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):

0.6

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.

slur-padding (number):

0.3

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 #<procedure ly:grob::vertical-skylines-from-
element-stencils (> #<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 #<procedure ly:axis-group-interface::height
(> #<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 #<procedure ly:side-position-interface::y-
aligned-side ( _ #:optional _ )> #<procedure ly:side-position-
interface::pure-y-aligned-side ( _ _ _ #:optional _ )> >
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): axis-group-interface (page 680), dynamic-interface (page 697), dynamic-line-spanner-interface (page 697), grob-interface (page 706), outside-staff-interface (page 732), side-position-interface (page 740), and spanner-interface (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.49 DynamicText

A dynamic text item like 'ff' or 'mp'. See also `DynamicLineSpanner` (page 538).

`DynamicText` objects are created by: `Dynamic_engraver` (page 420).

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 #<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 #<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 #<procedure 7f339439a2e0 at ice-9/eval.scm:333:13 (a)>>

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `dynamic-interface` (page 697), `dynamic-text-interface` (page 697), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `script-interface` (page 736), `self-alignment-interface` (page 738), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.50 DynamicTextSpanner

Dynamic text like ‘cresc’, usually followed by a (dashed) line. See also `DynamicLineSpanner` (page 538), and `TextSpanner` (page 653).

`DynamicTextSpanner` objects are created by: `Dynamic_engraver` (page 420).

Standard settings:

before-line-breaking (boolean):

dynamic-text-spanner::before-line-breaking

Dummy property, used to trigger a callback function.

bound-details (alist, with symbols as keys):

```
'((right (attach-dir . -1) (padding . 0.75))
  (right-broken (attach-dir . 1) (padding . 0.0))
  (left (attach-dir . -1)
        (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 (alist, with symbols as keys):

ly:horizontal-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 between 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 (alist, with symbols as keys):

ly:horizontal-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 #<procedure ly:grob::vertical-skylines-from-stencil (> #<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): `dynamic-interface` (page 697), `dynamic-text-spanner-interface` (page 697), `font-interface` (page 700), `grob-interface` (page 706), `horizontal-line-spanner-interface` (page 712), `line-interface` (page 718), `line-spanner-interface` (page 719), `spanner-interface` (page 748), and `text-interface` (page 757).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.51 Episema

An *episema* line (over a group of notes). Used in Gregorian chant.

Episema objects are created by: `Episema_engraver` (page 421).

Standard settings:

`bound-details` (alist, with symbols as keys):

```
'((left (padding . 0) (attach-dir . -1))
  (right (padding . 0) (attach-dir . 1)))
```

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` (alist, with symbols as keys):

```
ly:horizontal-line-spanner::calc-left-bound-info
```

An alist of properties for determining attachments of spanners to edges.

`right-bound-info` (alist, with symbols as keys):

```
ly:horizontal-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.

`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.

`Y-offset` (number):

```
#<unpure-pure-container #<procedure ly:side-position-interface::y-
aligned-side (_ #:optional _)> #<procedure ly:side-position-
interface::pure-y-aligned-side (_ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `episema-interface` (page 698), `font-interface` (page 700), `grob-interface` (page 706), `horizontal-line-spanner-interface` (page 712), `line-interface` (page 718), `line-spanner-interface` (page 719), `side-position-interface` (page 740), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.52 FingerGlideSpanner

A line connecting two `Fingering` (page 545), grobs, usually indicating a gliding finger for stringed instruments.

`FingerGlideSpanner` objects are created by: `Finger_glide_engraver` (page 422).

Standard settings:

`bound-details` (alist, with symbols as keys):

```
'((right (attach-dir . -1)
         (right-stub-length . 1)
         (padding . 0.2))
 (left (attach-dir . 1)
       (left-stub-length . 1)
       (padding . 0.2)))
```

An alist of properties for determining attachments of spanners to edges.

`dash-fraction` (number):

0.4

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):

1

The length of one dash together with whitespace. If negative, no line is drawn at all.

`details` (alist, with symbols as keys):

```
'((bow-direction . #f))
```

Alist 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.

`left-bound-info` (alist, with symbols as keys):

```
ly:line-spanner::calc-left-bound-info
```

An alist of properties for determining attachments of spanners to edges.

`minimum-length` (dimension, in staff space):

2.5

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.

`minimum-length-after-break` (dimension, in staff space):

2.5

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):

```
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` (alist, with symbols as keys):

```
ly:line-spanner::calc-right-bound-info
```

An alist of properties for determining attachments of spanners to edges.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`
 Dummy variable for triggering spacing routines.

`stencil` (stencil):
`finger-glide::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.

`thickness` (number):
`1.4`
 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 #<procedure ly:grob::vertical-skylines-from-stencil (_)> #<procedure ly:grob::pure-simple-vertical-skylines-from-extents (_ _ _)> >`
 Two skylines, one above and one below this grob.

`zigzag-length` (dimension, in staff space):
`1`
 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):
`1`
 The width of one zigzag squiggle. This number is adjusted slightly so that the spanner line can be constructed from a whole number of squiggles.

This object supports the following interface(s): `finger-glide-interface` (page 698), `grob-interface` (page 706), `line-spanner-interface` (page 719), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.53 Fingering

A fingering symbol (usually a digit). See also `FingeringColumn` (page 547), and `StrokeFinger` (page 639).

Fingering objects are created by: `Fingering_engraver` (page 423), and `New_fingering_engraver` (page 437).

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-features (list):`

`('("cv47" "ss01")`

Opentype features.

`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 #<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): `finger-interface` (page 700), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), `text-interface` (page 757), and `text-script-interface` (page 758).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.54 FingeringColumn

An auxiliary grob to align stacked Fingering (page 545), grobs.

FingeringColumn objects are created by: `Fingering_column_engraver` (page 422).

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): `fingering-column-interface` (page 700), `grob-interface` (page 706), and `item-interface` (page 714).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.55 Flag

A flag (in the musical sense).

Flag objects are created by: `Stem_engraver` (page 450).

Standard settings:

```
color (color):
  #<procedure 7f33943bf2e0 at ice-9/eval.scm:333:13 (a)>
```

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 7f33943bf4c0 at ice-9/eval.scm:333:13 (a)>
```

This makes the grob invisible.

```
vertical-skylines (pair of skylines):
  #<unpure-pure-container #<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 #<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 #<procedure ly:flag::calc-y-offset (>
  #<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): `flag-interface` (page 700), `font-interface` (page 700), `grob-interface` (page 706), and `item-interface` (page 714).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.56 Footnote

A footnote mark (usually a number) with a pointing line attached to another grob.

Footnote objects are created by: `Footnote_engraver` (page 423).

Standard settings:

`after-line-breaking` (boolean):

`ly:balloon-interface::remove-irrelevant-spanner`

Dummy property, used to trigger callback for `after-line-breaking`.

`annotation-balloon` (boolean):

`#f`

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 7f33943c93a0 at ice-9/eval.scm:333:13 (a)>`

If set, footnotes are automatically numbered.

`break-visibility` (vector):

`#<procedure 7f33943c91a0 at ice-9/eval.scm:333:13 (a)>`

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 7f33943cbc40 at ice-9/eval.scm:333:13 (a)>`

A footnote for the grob.

`stencil` (stencil):

`ly:balloon-interface::print`

The symbol to print.

`text` (markup):

`#<procedure 7f33943cb680 at ice-9/eval.scm:333:13 (a)>`

Text markup. See Section “Formatting text” in *Notation Reference*.

`X-extent` (pair of numbers):

`#f`

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

`X-offset` (number):

`#<procedure 7f33943cb300 at ice-9/eval.scm:333:13 (a)>`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):

`#f`

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):

```
#<procedure 7f33943cb100 at ice-9/eval.scm:333:13 (a)>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `balloon-interface` (page 682), `font-interface` (page 700), `footnote-interface` (page 702), `grob-interface` (page 706), `sticky-grob-interface` (page 754), and `text-interface` (page 757).

This object can be of either of the following classes: `Item` (characterized by `item-interface`) or `Spanner` (characterized by `spanner-interface`). It supports the following interfaces conditionally depending on the class: `item-interface` (page 714), and `spanner-interface` (page 748).

3.1.57 FretBoard

A fretboard diagram.

FretBoard objects are created by: `Fretboard_engraver` (page 424).

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)`.

`fret-diagram-details` (alist, with symbols as keys):

```
'((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 `arabic`, `roman-ij-lower`, `roman-ij-upper`, `roman-lower`, `roman-upper`, `arabic` and `custom`. In the last 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 $\text{thickness} * (1 + \text{string-thickness-factor})^{(k-1)}$. 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.

`stencil (stencil):`

`fret-board::calc-stencil`

The symbol to print.

`Y-extent (pair of numbers):`

`#<unpure-pure-container #<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): `chord-name-interface` (page 692), `font-interface` (page 700), `fret-diagram-interface` (page 702), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), and `rhythmic-grob-interface` (page 736).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.58 Glissando

A glissando line.

Glissando objects are created by: `Glissando_engraver` (page 424).

Standard settings:

`after-line-breaking` (boolean):

`ly:spanner::kill-zero-spanned-time`

Dummy property, used to trigger callback for `after-line-breaking`.

`bound-details` (alist, with symbols as keys):

```
'((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` (alist, with symbols as keys):

`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` (alist, with symbols as keys):

`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.

vertical-skylines (pair of skylines):

```
#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-
stencil (_)> #<procedure ly:grob::pure-simple-vertical-skylines-from-
extents (_ _ _)>>
```

Two skylines, one above and one below this grob.

zigzag-width (dimension, in staff space):

0.75

The width of one zigzag squiggle. This number is adjusted slightly so that the spanner line can be constructed from a whole number of squiggles.

This object supports the following interface(s): `glissando-interface` (page 704), `grob-interface` (page 706), `line-interface` (page 718), `line-spanner-interface` (page 719), `spanner-interface` (page 748), and `unbreakable-spanner-interface` (page 764).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.59 GraceSpacing

An auxiliary grob to handle (horizontal) spacing of grace notes. See also `NoteSpacing` (page 597), `StaffSpacing` (page 632), and `SpacingSpanner` (page 625).

GraceSpacing objects are created by: `Grace_spacing_engraver` (page 426).

Standard settings:

`common-shortest-duration` (moment):

`grace-spacing::calc-shortest-duration`

The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

`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 Reference*.

`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): `grace-spacing-interface` (page 704), `grob-interface` (page 706), `spacing-options-interface` (page 746), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.60 GridChordName

A chord name in a chord grid.

GridChordName objects are created by: `Grid_chord_name_engraver` (page 426).

Standard settings:

`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.

X-offset (number):

#<procedure 7f3392933240 at ice-9/eval.scm:333:13 (a)>

The horizontal amount that this object is moved relative to its X-parent.

Y-offset (number):

#<procedure 7f33929ac8a0 at ice-9/eval.scm:333:13 (a)>

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `accidental-switch-interface` (page 678), `font-interface` (page 700), `grid-chord-name-interface` (page 705), `grob-interface` (page 706), `spanner-interface` (page 748), and `text-interface` (page 757).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.61 GridLine

A vertical line between staves, indicating rhythmic synchronization. See also `GridPoint` (page 555).

`GridLine` objects are created by: `Grid_line_span_engraver` (page 426).

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.

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): `grid-line-interface` (page 705), `grob-interface` (page 706), `item-interface` (page 714), and `self-alignment-interface` (page 738).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.62 GridPoint

An auxiliary grob marking a start or end point for a `GridLine` (page 554), `grob`.

`GridPoint` objects are created by: `Grid_point_engraver` (page 426).

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): `grid-point-interface` (page 705), `grob-interface` (page 706), and `item-interface` (page 714).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.63 Hairpin

A hairpin. See also `DynamicLineSpanner` (page 538).

`Hairpin` objects are created by: `Dynamic_engraver` (page 420).

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):
`#f`
 Put a circle at start/end of hairpins (al/del niente).

`endpoint-alignments` (pair of numbers):
`'(-1 . 1)`
 A pair of numbers representing the alignments of an object's endpoints. E.g., the ends of a hairpin relative to `NoteColumn` grobs.

`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 #<procedure ly:grob::vertical-skylines-from-stencil (_)> #<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 #<procedure ly:grob::stencil-height (_)> #<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 #<procedure ly:self-alignment-interface::y-
aligned-on-self (>)> #<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): `dynamic-interface` (page 697), `grob-interface` (page 706), `hairpin-interface` (page 710), `line-interface` (page 718), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.64 HorizontalBracket

A horizontal bracket between notes. See also `HorizontalBracketText` (page 558), and `MeasureSpanner` (page 583).

`HorizontalBracket` objects are created by: `Horizontal_bracket_engraver` (page 427).

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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _)>>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): *grob-interface* (page 706), *horizontal-bracket-interface* (page 711), *line-interface* (page 718), *outside-staff-interface* (page 732), *side-position-interface* (page 740), and *spanner-interface* (page 748).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.65 HorizontalBracketText

Text (markup) for a *HorizontalBracket* (page 557), grob.

HorizontalBracketText objects are created by: *Horizontal_bracket_engraver* (page 427).

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.

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:horizontal-bracket-text::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-offset (number):

```
#<unpure-pure-container #<procedure ly:side-position-interface::y-
aligned-side (_ #:optional _)> #<procedure ly:side-position-
interface::pure-y-aligned-side (_ _ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): accidental-switch-interface (page 678), font-interface (page 700), grob-interface (page 706), horizontal-bracket-text-interface (page 712), outside-staff-interface (page 732), self-alignment-interface (page 738), side-position-interface (page 740), spanner-interface (page 748), and text-interface (page 757).

This object is of class Spanner (characterized by spanner-interface (page 748)).

3.1.66 InstrumentName

An instrument name, usually displayed to the left of a staff.

InstrumentName objects are created by: Instrument_name_engraver (page 427).

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.

padding (dimension, in staff space):

0.3

Add this much extra space between objects that are next to each other.

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.

`stencil (stencil):`
`system-start-text::print`
 The symbol to print.

`X-offset (number):`
`system-start-text::calc-x-offset`
 The horizontal amount that this object is moved relative to its X-parent.

`Y-offset (number):`
`system-start-text::calc-y-offset`
 The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `accidental-switch-interface` (page 678), `font-interface` (page 700), `grob-interface` (page 706), `self-alignment-interface` (page 738), `side-position-interface` (page 740), `spanner-interface` (page 748), `system-start-text-interface` (page 756), and `text-interface` (page 757).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.67 InstrumentSwitch

This grob is deprecated. Do not use it.

`InstrumentSwitch` objects are created by: `Instrument_switch_engraver` (page 428).

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).

`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):`
 #f

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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _)>>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `accidental-switch-interface` (page 678), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.68 JumpScript

A grob to display a 'point of departure' like *D.C. al fine*.

JumpScript objects are created by: `Jump_engraver` (page 428).

Standard settings:

`after-line-breaking (boolean):`

`ly:side-position-interface::move-to-extremal-staff`

Dummy property, used to trigger callback for after-line-breaking.

`baseline-skip (dimension, in staff space):`

2

Distance between base lines of multiple lines of text.

`break-align-symbols` (list):

'(staff-bar key-signature clef)

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):

##(##t ##t ##f)

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-shape` (symbol):

'italic

Select the shape of a font. Choices include upright, italic, caps.

`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):

1350

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):

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.

```

stencil (stencil):
  ly:text-interface::print
  The symbol to print.

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<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 #<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 #<procedure ly:side-position-interface::y-
  aligned-side (_ #:optional _)> #<procedure ly:side-position-
  interface::pure-y-aligned-side (_ _ #:optional _)> >
  The vertical amount that this object is moved relative to its Y-parent.

```

This object supports the following interface(s): `break-alignable-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `jump-script-interface` (page 716), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.69 KeyCancellation

A key cancellation, normally consisting of naturals, to be displayed (if necessary) immediately before a `KeySignature` (page 566), grob if the key changes.

`KeyCancellation` objects are created by: `Key_engraver` (page 429).

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.

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 (alist, with symbols as keys):

```
'((time-signature extra-space . 1.25)
  (signum-repetitionis extra-space . 0.6)
  (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 #<procedure ly:grob::vertical-skylines-from-stencil (>>`

Two skylines, one above and one below this grob.

`Y-extent (pair of numbers):`

`#<unpure-pure-container #<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 #<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): `accidental-switch-interface` (page 678), `break-aligned-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `key-cancellation-interface` (page 716), `key-signature-interface` (page 716), `pure-from-neighbor-interface` (page 735), and `staff-symbol-referencer-interface` (page 751).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.70 KeySignature

A key signature. See also `KeyCancellation` (page 563).

`KeySignature` objects are created by: `Key_engraver` (page 429).

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.

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 (alist, with symbols as keys):

```
'((ambitus extra-space . 1.15)
  (time-signature extra-space . 1.15)
  (signum-repetitionis extra-space . 1.1)
  (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 #<procedure ly:grob::vertical-skylines-from-stencil (>>`

Two skylines, one above and one below this grob.

`Y-extent (pair of numbers):`

`#<unpure-pure-container #<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 #<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): `accidental-switch-interface` (page 678), `break-aligned-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `key-signature-interface` (page 716), `pure-from-neighbor-interface` (page 735), and `staff-symbol-referencer-interface` (page 751).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.71 `KievanLigature`

An auxiliary grob to handle a melisma (ligature) as used in Kievan square notation. See also `MensuralLigature` (page 584), `VaticanaLigature` (page 669), and `LigatureBracket` (page 573).

`KievanLigature` objects are created by: `Kievan_ligature_engraver` (page 431).

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): `font-interface` (page 700), `grob-interface` (page 706), `kievan-ligature-interface` (page 717), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.72 `LaissezVibrerTie`

A `laissez-vibrer` tie (i.e., a tie from a note into nothing). See also `LaissezVibrerTieColumn` (page 570), `RepeatTie` (page 609), and `Tie` (page 654).

`LaissezVibrerTie` objects are created by: `Laissez_vibrer_engraver` (page 431).

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 (alist, with symbols as keys):
  '((ratio . 0.333) (height-limit . 1.0))
  Alist 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):
  ly:tie::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 #<procedure ly:grob::vertical-skylines-from-
stencil (>>
```

Two skylines, one above and one below this grob.

Y-extent (pair of numbers):

```
#<unpure-pure-container #<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): *bezier-curve-interface* (page 688), *grob-interface* (page 706), *item-interface* (page 714), *semi-tie-interface* (page 739), and *tie-interface* (page 759).

This object is of class *Item* (characterized by *item-interface* (page 714)).

3.1.73 *LaissezVibrerTieColumn*

An auxiliary grob to determine direction and shape of stacked *LaissezVibrerTie* (page 569), grobs.

LaissezVibrerTieColumn objects are created by: *Laissez_vibrer_engraver* (page 431).

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):

```
#f
```

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

Y-extent (pair of numbers):

```
#f
```

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): *grob-interface* (page 706), *item-interface* (page 714), and *semi-tie-column-interface* (page 738).

This object is of class *Item* (characterized by *item-interface* (page 714)).

3.1.74 *LedgerLineSpanner*

An auxiliary grob to manage ledger lines of a whole staff.

LedgerLineSpanner objects are created by: *Ledger_line_engraver* (page 431).

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 #<procedure ly:grob::vertical-skylines-from-stencil (_)> #<procedure ly:grob::pure-simple-vertical-skylines-from-extents (_ _ _)>>`
 Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`#f`
 Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#f`
 Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 706), `ledger-line-spanner-interface` (page 717), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.75 LeftEdge

The left edge of a staff. Useful as an anchor point for other grobs.

LeftEdge objects are created by: `Break_align_engraver` (page 411).

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 (alist, with symbols as keys):

```
'((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)
 (signum-repetitionis extra-space . 0.0)
 (staff-bar extra-space . 0.0)
 (staff-ellipsis 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): `break-aligned-interface` (page 689), `grob-interface` (page 706), and `item-interface` (page 714).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.76 LigatureBracket

A horizontal bracket over a group of notes, usually indicating an ancient ligature if transcribed into modern notation. See also `KievanLigature` (page 568), `MensuralLigature` (page 584), and `VaticanaLigature` (page 669).

`LigatureBracket` objects are created by: `Ligature_bracket_engraver` (page 431).

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 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*).

padding (dimension, in staff space):

2.0

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 (*start* . *end*), where *start* and *end* are vertical positions 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):

#f

Draw a slur instead of a bracket for tuplets.

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): *grob-interface* (page 706), *line-interface* (page 718), *spanner-interface* (page 748), and *tuplet-bracket-interface* (page 762).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.77 LyricExtender

An extender line in lyrics.

LyricExtender objects are created by: *Extender_engraver* (page 421).

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*).

This object supports the following interface(s): *grob-interface* (page 706), *lyric-extender-interface* (page 721), *lyric-interface* (page 722), and *spanner-interface* (page 748).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.78 LyricHyphen

A hyphen in lyrics. See also *VowelTransition* (page 675).

LyricHyphen objects are created by: *Hyphen_engraver* (page 427).

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 #<procedure ly:grob::vertical-skylines-from-
  stencil (> #<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): *font-interface* (page 700), *grob-interface* (page 706), *lyric-hyphen-interface* (page 721), *lyric-interface* (page 722), and *spanner-interface* (page 748).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.79 LyricRepeatCount

A repeat count in lyrics.

LyricRepeatCount objects are created by: *Lyric_repeat_count_engraver* (page 432).

Standard settings:

```
break-align-symbols (list):
  '(staff-bar breathing-sign)
```

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):
  #(#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):
  '(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):
  '(-1.0 . 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)*.

font-series (symbol):

'medium

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.

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.

non-musical (boolean):

#t

True if the grob belongs to a `NonMusicalPaperColumn`.

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):

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.

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 7f3393c55500 at ice-9/eval.scm:333:13 (a)>

Text markup. See Section “Formatting text” in *Notation Reference*.

vertical-skylines (pair of skylines):

#<unpure-pure-container #<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-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 #<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): `break-alignable-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `lyric-interface` (page 722), `lyric-repeat-count-interface` (page 722), `self-alignment-interface` (page 738), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.80 LyricSpace

A space in lyrics.

`LyricSpace` objects are created by: `Hyphen_engraver` (page 427).

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):

`#f`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

Y-extent (pair of numbers):

`#f`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 706), `lyric-hyphen-interface` (page 721), `lyric-space-interface` (page 722), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.81 LyricText

A chunk of text in lyrics. See also `LyricExtender` (page 574), `LyricHyphen` (page 575), `LyricSpace` (page 578), and `VowelTransition` (page 675).

`LyricText` objects are created by: `Lyric_engraver` (page 431).

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 7f3393c56260 at ice-9/eval.scm:333:13 (a)>`

Text markup. See Section “Formatting text” in *Notation Reference*.

`vertical-skylines` (pair of skylines):

`#<unpure-pure-container #<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 #<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): font-interface (page 700), grob-interface (page 706), item-interface (page 714), lyric-syllable-interface (page 722), rhythmic-grob-interface (page 736), self-alignment-interface (page 738), and text-interface (page 757).

This object is of class Item (characterized by item-interface (page 714)).

3.1.82 MeasureCounter

A grob to print a counter for measures.

MeasureCounter objects are created by: Measure_counter_engraver (page 434).

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-features (list):

('("cv47")

Opentype features.

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.

`number-range-separator` (markup):

"_"

For a measure counter extending over several measures (like with compressed multi-measure rests), this is the separator between the two printed numbers.

`outside-staff-horizontal-padding` (number):

0.5

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):

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.

`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)
```

`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):

`measure-counter::text`

Text markup. See Section "Formatting text" in *Notation Reference*.

`word-space` (dimension, in staff space):

0.2

Space to insert between words in texts.

X-offset (number):

```
centered-spanner-interface::calc-x-offset
```

The horizontal amount that this object is moved relative to its X-parent.

Y-offset (number):

```
#<unpure-pure-container #<procedure ly:side-position-interface::y-
aligned-side (_ #:optional _)> #<procedure ly:side-position-
interface::pure-y-aligned-side (_ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `centered-spanner-interface` (page 692), `font-interface` (page 700), `grob-interface` (page 706), `measure-counter-interface` (page 722), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), `spanner-interface` (page 748), and `text-interface` (page 757).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.83 MeasureGrouping

A measure grouping or conducting sign.

MeasureGrouping objects are created by: `Measure_grouping_engraver` (page 434).

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 #<procedure ly:side-position-interface::y-
aligned-side (_ #:optional _)> #<procedure ly:side-position-
interface::pure-y-aligned-side (_ _ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): *grob-interface* (page 706), *measure-grouping-interface* (page 723), *outside-staff-interface* (page 732), *side-position-interface* (page 740), and *spanner-interface* (page 748).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.84 MeasureSpanner

A horizontal bracket between bar lines. See also *HorizontalBracket* (page 557).

MeasureSpanner objects are created by: *Measure_spanner_engraver* (page 435).

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 *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.

spacing-pair (pair):

```
'(staff-bar . 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 following override:

```
\override MultiMeasureRest.spacing-pair =  
      #'(staff-bar . staff-bar)
```

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:measure-spanner::print
```

The symbol to print.

Y-offset (number):

```
#<unpure-pure-container #<procedure ly:side-position-interface::y-  
aligned-side (_ #:optional _)> #<procedure ly:side-position-  
interface::pure-y-aligned-side (_ _ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): accidental-switch-interface (page 678), font-interface (page 700), grob-interface (page 706), line-interface (page 718), measure-spanner-interface (page 723), outside-staff-interface (page 732), self-alignment-interface (page 738), side-position-interface (page 740), spanner-interface (page 748), and text-interface (page 757).

This object is of class Spanner (characterized by spanner-interface (page 748)).

3.1.85 MelodyItem

An auxiliary grob to help alter the stem directions of middle notes on a staff so that they follow the melody.

MelodyItem objects are created by: Melody_engraver (page 435).

Standard settings:

```
neutral-direction (direction):
```

```
-1
```

Which direction to take in the center of the staff.

This object supports the following interface(s): grob-interface (page 706), item-interface (page 714), and melody-spanner-interface (page 724).

This object is of class Item (characterized by item-interface (page 714)).

3.1.86 MensuralLigature

A grob to display a ligature as used in mensural notation. See also KievanLigature (page 568), VaticanaLigature (page 669), and LigatureBracket (page 573).

MensuralLigature objects are created by: Mensural_ligature_engraver (page 435).

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): *font-interface* (page 700), *grob-interface* (page 706), *mensural-ligature-interface* (page 724), and *spanner-interface* (page 748).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.87 MetronomeMark

A metronome mark. This is either a precise tempo indication like ‘quarter note = 80’, or an arbitrary piece of text (like ‘Allegro’), possibly followed by a precise indication in parentheses.

MetronomeMark objects are created by: *Metronome_mark_engraver* (page 436).

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: 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).
```

flag-style (symbol):

'default

The style of the flag to be used with MetronomeMark. Available are

'modern-straight-flag, 'old-straight-flag, flat-flag, mensural and

'default

non-break-align-symbols (list):

'(paper-column-interface)

A list of symbols that determine which NON-break-aligned interfaces to align this to.

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):

1300

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):

-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.

vertical-skylines (pair of skylines):

#<unpure-pure-container #<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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-alignable-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `metronome-mark-interface` (page 725), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.88 MultiMeasureRest

A multi-measure rest. See also `MultiMeasureRestNumber` (page 588), `MultiMeasureRestText` (page 591), `MultiMeasureRestScript` (page 590), and `Rest` (page 611).

`MultiMeasureRest` objects are created by: `Multi_measure_rest_engraver` (page 437).

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):

'()

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*.

`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 de-
  fault 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 #<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 #<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): *font-interface* (page 700), *grob-interface* (page 706), *multi-measure-interface* (page 725), *multi-measure-rest-interface* (page 725), *outside-staff-interface* (page 732), *rest-interface* (page 735), *spanner-interface* (page 748), and *staff-symbol-referencer-interface* (page 751).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.89 MultiMeasureRestNumber

A grob to print the length of a *MultiMeasureRest* (page 587), *grob*.

MultiMeasureRestNumber objects are created by: *Multi_measure_rest_engraver* (page 437).

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).

`font-features` (list):

'("cv47")

Opentype features.

`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 #<procedure ly:grob::vertical-skylines-from-
stencil (_)> #<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 #<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 #<procedure ly:side-position-interface::y-
aligned-side (_ #:optional _)> #<procedure ly:side-position-
interface::pure-y-aligned-side (_ _ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 700), `grob-interface` (page 706), `multi-measure-interface` (page 725), `multi-measure-rest-number-interface` (page 726), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), `spanner-interface` (page 748), and `text-interface` (page 757).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.90 MultiMeasureRestScript

An articulation (like a fermata) attached to a `MultiMeasureRest` (page 587), `grob`. See also `Script` (page 612).

`MultiMeasureRestScript` objects are created by: `Multi_measure_rest_engraver` (page 437).

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 according 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 `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):

ly:script-interface::print

The symbol to print.

vertical-skylines (pair of skylines):

```
#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-
stencil (_) > #<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 #<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 #<procedure ly:side-position-interface::y-
aligned-side ( _ #:optional _ ) > #<procedure ly:side-position-
interface::pure-y-aligned-side ( _ _ _ #:optional _ ) > >
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): font-interface (page 700), grob-interface (page 706), multi-measure-interface (page 725), outside-staff-interface (page 732), script-interface (page 736), self-alignment-interface (page 738), side-position-interface (page 740), and spanner-interface (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.91 MultiMeasureRestText

A text markup for a `MultiMeasureRest` (page 587), grob. See also `TextScript` (page 651).

`MultiMeasureRestText` objects are created by: `Multi_measure_rest_engraver` (page 437).

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.

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.

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 #<procedure ly:grob::vertical-skylines-from-
stencil (> #<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 #<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 #<procedure ly:side-position-interface::y-
aligned-side (_ #:optional _)> #<procedure ly:side-position-
interface::pure-y-aligned-side (_ _ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 700), `grob-interface` (page 706), `multi-measure-interface` (page 725), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), `spanner-interface` (page 748), and `text-interface` (page 757).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.92 NonMusicalPaperColumn

An auxiliary grob grouping non-musical items to handle the flexible horizontal space between non-musical and musical columns. Grobs that have the property `non-musical` set to `#t` belong to this column.

`NonMusicalPaperColumn` objects are created by: `Paper_column_engraver` (page 440).

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.

`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 column. 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): axis-group-interface (page 680), font-interface (page 700), grob-interface (page 706), item-interface (page 714), non-musical-paper-column-interface (page 727), paper-column-interface (page 732), separation-item-interface (page 740), and spaceable-grob-interface (page 745).

This object is of class Paper-column (characterized by paper-column-interface (page 732)).

3.1.93 NoteCollision

An auxiliary grob to group NoteColumn (page 595), grobs from several voices, mainly to handle note collisions. See also RestCollision (page 612).

NoteCollision objects are created by: Collision_engraver (page 414).

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.

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):

```
#<unpure-pure-container #<procedure ly:axis-group-interface::height
(_)> #<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): `axis-group-interface` (page 680), `grob-interface` (page 706), `item-interface` (page 714), and `note-collision-interface` (page 728).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.94 NoteColumn

An auxiliary grob to align stacked notes, stems, flags, accidentals, and other items from the same voice. See also `NoteCollision` (page 594).

`NoteColumn` objects are created by: `Rhythmic_column_engraver` (page 445).

Standard settings:

`axes` (list):

```
'(0 1)
```

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`bend-me` (boolean):

```
'()
```

Decide whether this grob is bent.

`horizontal-skylines` (pair of skylines):

```
ly:separation-item::calc-skylines
```

Two skylines, one to the left and one to the right of this grob.

`main-extent` (pair of numbers):

```
ly:note-column::calc-main-extent
```

The horizontal extent of a `NoteColumn` grob without taking suspended `NoteHead` grobs into account (i.e., `NoteHeads` forced into the unnatural direction of the Stem because of a chromatic clash).

`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.

`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):

```
#<unpure-pure-container #<procedure ly:axis-group-interface::height
(_)> #<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): `axis-group-interface` (page 680), `bend-interface` (page 687), `grob-interface` (page 706), `item-interface` (page 714), `note-column-interface` (page 728), and `separation-item-interface` (page 740).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.95 NoteHead

A note head. See also `TabNoteHead` (page 647).

`NoteHead` objects are created by: `Completion_heads_engraver` (page 414), `Drum_notes_engraver` (page 419), and `Note_heads_engraver` (page 438).

Standard settings:

`bend-me` (boolean):

```
'()
```

Decide whether this grob is bent.

`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 #<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 #<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): `bend-interface` (page 687), `font-interface` (page 700), `gregorian-ligature-interface` (page 704), `grob-interface` (page 706), `item-interface` (page 714), `ledgered-interface` (page 717), `ligature-head-interface` (page 718), `mensural-ligature-interface` (page 724), `note-head-interface` (page 729), `rhythmic-grob-interface` (page 736), `rhythmic-head-interface` (page 736), `staff-symbol-referencer-interface` (page 751), and `vaticana-ligature-interface` (page 764).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.96 NoteName

A textual representation of a note name.

`NoteName` objects are created by: `Note_name_engraver` (page 438).

Standard settings:

`stencil` (stencil):

`ly:text-interface::print`

The symbol to print.

Y-extent (pair of numbers):

`#<unpure-pure-container #<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): `accidental-switch-interface` (page 678), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `note-name-interface` (page 730), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.97 NoteSpacing

An auxiliary grob to handle (horizontal) spacing of notes. See also `GraceSpacing` (page 553), `StaffSpacing` (page 632), and `SpacingSpanner` (page 625).

`NoteSpacing` objects are created by: `Note_spacing_engraver` (page 439).

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 configurations. 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 configurations. For opposite directions, this amount is the correction for two normal sized stems that overlap completely.

This object supports the following interface(s): `grob-interface` (page 706), `item-interface` (page 714), `note-spacing-interface` (page 730), and `spacing-interface` (page 746).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.98 OttavaBracket

An ottava bracket.

OttavaBracket objects are created by: `Ottava_spanner_engraver` (page 439).

Standard settings:

dash-fraction (number):

0.3

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

edge-height (pair):

'(0 . 0.8)

A pair of numbers specifying the heights of the vertical edges: (*left-height* . *right-height*).

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.

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.

`outside-staff-priority` (number):

400

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.

`shorten-pair` (pair of numbers):

'(-0.8 . -0.6)

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 #<procedure ly:grob::vertical-skylines-from-
stencil (_)> #<procedure ly:grob::pure-simple-vertical-skylines-from-
extents (_ _ _)>>
```

Two skylines, one above and one below this grob.

`Y-offset` (number):

```
#<unpure-pure-container #<procedure ly:side-position-interface::y-
aligned-side (_ #:optional _)> #<procedure ly:side-position-
interface::pure-y-aligned-side (_ _ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 700), `grob-interface` (page 706), `horizontal-bracket-interface` (page 711), `line-interface` (page 718), `ottava-bracket-interface` (page 731), `outside-staff-interface` (page 732), `side-position-interface` (page 740), `spanner-interface` (page 748), and `text-interface` (page 757).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.99 PaperColumn

An auxiliary grob grouping musical items to handle the flexible horizontal space between musical and non-musical columns. See also `NonMusicalPaperColumn` (page 593).

`PaperColumn` objects are created by: `Paper_column_engraver` (page 440).

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.

`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): `axis-group-interface` (page 680), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `musical-paper-column-interface` (page 726), `paper-column-interface` (page 732), `separation-item-interface` (page 740), and `spaceable-grob-interface` (page 745).

This object is of class `Paper_column` (characterized by `paper-column-interface` (page 732)).

3.1.100 Parentheses

A grob to create parentheses around other grobs.

Parentheses objects are created by: `Parenthesis_engraver` (page 441).

Standard settings:

`break-visibility (vector):`

`#<procedure 7f3393c92740 at ice-9/eval.scm:333:13 (a)>`

A vector of 3 booleans, `#(end-of-line unbroken begin-of-line)`. `#t` means visible, `#f` means killed.

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-interface::print`

The symbol to print.

stencils (list):

`parentheses-interface::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-interface::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): `font-interface` (page 700), `grob-interface` (page 706), `parentheses-interface` (page 733), and `sticky-grob-interface` (page 754).

This object can be of either of the following classes: `Item` (characterized by `item-interface`) or `Spanner` (characterized by `spanner-interface`). It supports the following interfaces conditionally depending on the class: `item-interface` (page 714), and `spanner-interface` (page 748).

3.1.101 PercentRepeat

A percent symbol for repeating a bar. See also `PercentRepeatCounter` (page 602), `DoublePercentRepeat` (page 532), `DoubleRepeatSlash` (page 535), and `RepeatSlash` (page 608).

`PercentRepeat` objects are created by: `Percent_repeat_engraver` (page 441).

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).

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.

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 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:percent-repeat-interface::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*).

X-offset (number):

centered-spanner-interface::calc-x-offset

The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): centered-spanner-interface (page 692), font-interface (page 700), grob-interface (page 706), multi-measure-rest-interface (page 725), percent-repeat-interface (page 733), and spanner-interface (page 748).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.102 PercentRepeatCounter

A grob to print a counter for PercentRepeat (page 601), grobs.

PercentRepeatCounter objects are created by: Percent_repeat_engraver (page 441).

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. Currently, only Lilypond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

font-features (list):

'("cv47")

Opentype features.

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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _)>>

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 700), `grob-interface` (page 706), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), `spanner-interface` (page 748), and `text-interface` (page 757).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.103 PhrasingSlur

A phrasing slur, indicating a ‘musical sentence’. See also `Slur` (page 621).

`PhrasingSlur` objects are created by: `Phrasing_slur_engraver` (page 442).

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` (alist, with symbols as keys):

```
'((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))
```

Alist 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 #<procedure ly:grob::vertical-skylines-from-stencil (> #<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 #<procedure ly:slur::height (> #<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): `bezier-curve-interface` (page 688), `grob-interface` (page 706), `outside-staff-interface` (page 732), `slur-interface` (page 743), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.104 PianoPedalBracket

A piano pedal bracket. It can also be part of `SostenutoPedal` (page 623), `SustainPedal` (page 640), or `UnaCordaPedal` (page 666), grobs if they are printed in a bracketed style.

PianoPedalBracket objects are created by: `Piano_pedal_engraver` (page 442).

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*).

`shorten-pair` (pair of numbers):

'(0.0 . 0.0)

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:piano-pedal-bracket::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.

`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 #<procedure ly:grob::vertical-skylines-from-
stencil (>) #<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): `grob-interface` (page 706), `line-interface` (page 718), `piano-pedal-bracket-interface` (page 734), `piano-pedal-interface` (page 734), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.105 RehearsalMark

A rehearsal mark.

RehearsalMark objects are created by: `Mark_engraver` (page 432).

Standard settings:

`after-line-breaking` (boolean):

`ly:side-position-interface::move-to-extremal-staff`

Dummy property, used to trigger callback for `after-line-breaking`.

`baseline-skip` (dimension, in staff space):

2

Distance between base lines of multiple lines of text.

`break-align-symbols` (list):

`'(staff-bar key-signature clef)`

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 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 #<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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _)>>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `accidental-switch-interface` (page 678), `break-alignable-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `mark-interface` (page 722), `outside-staff-interface` (page 732), `rehearsal-mark-interface` (page 735), `self-alignment-interface` (page 738), `side-position-interface` (page 740), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.106 RepeatSlash

A symbol consisting of one or more slashes for repeating patterns shorter than a single measure, and which contain identical durations. See also `PercentRepeat` (page 601), `DoublePercentRepeat` (page 532), and `DoubleRepeatSlash` (page 535).

`RepeatSlash` objects are created by: `Slash_repeat_engraver` (page 447).

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-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 `Staff.StaffSymbol.thickness`).

`Y-extent (pair of numbers):`
`#<unpure-pure-container #<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): `grob-interface` (page 706), `item-interface` (page 714), `percent-repeat-interface` (page 733), and `rhythmic-grob-interface` (page 736).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.107 RepeatTie

A repeat tie (i.e., a tie from nothing to a note). See also `RepeatTieColumn` (page 610), `LaissezVibrerTie` (page 569), and `Tie` (page 654).

`RepeatTie` objects are created by: `Repeat_tie_engraver` (page 444).

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 (alist, with symbols as keys):`
`'((ratio . 0.333) (height-limit . 1.0))`
Alist 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):
  ly:tie::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 #<procedure ly:grob::vertical-skylines-from-
  stencil (>>
  Two skylines, one above and one below this grob.
```

```
Y-extent (pair of numbers):
  #<unpure-pure-container #<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): `bezier-curve-interface` (page 688), `grob-interface` (page 706), `item-interface` (page 714), `semi-tie-interface` (page 739), and `tie-interface` (page 759).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.108 RepeatTieColumn

An auxiliary grob to determine direction and shape of stacked `RepeatTie` (page 609), grobs.

`RepeatTieColumn` objects are created by: `Repeat_tie_engraver` (page 444).

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):
  #f
  Extent (size) in the X direction, measured in staff-space units, relative to object’s
  reference point.
```

Y-extent (pair of numbers):

#f

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 706), `item-interface` (page 714), and `semi-tie-column-interface` (page 738).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.109 Rest

An ordinary rest. See also `MultiMeasureRest` (page 587).

Rest objects are created by: `Completion_rest_engraver` (page 415), and `Rest_engraver` (page 444).

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 #<procedure ly:grob::vertical-skylines-from-
stencil (>> #<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 #<procedure ly:rest::height (>> #<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 #<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): `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `rest-interface` (page 735), `rhythmic-grob-interface` (page 736), `rhythmic-head-interface` (page 736), and `staff-symbol-referencer-interface` (page 751).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.110 RestCollision

An auxiliary grob to handle rest collisions of different voices. See also `NoteCollision` (page 594).

`RestCollision` objects are created by: `Rest_collision_engraver` (page 444).

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): `grob-interface` (page 706), `item-interface` (page 714), and `rest-collision-interface` (page 735).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.111 Script

An articulation (staccato, accent, etc.). See also `ScriptColumn` (page 613), `ScriptRow` (page 614), and `MultiMeasureRestScript` (page 590).

`Script` objects are created by: `Drum_notes_engraver` (page 419), `New_fingering_engraver` (page 437), and `Script_engraver` (page 445).

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):`

`#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-stencil (>>`

Two skylines, one above and one below this grob.

`X-offset (number):`

`script-interface::calc-x-offset`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent (pair of numbers):`

`#<unpure-pure-container #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ _ #:optional _)>>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `script-interface` (page 736), `self-alignment-interface` (page 738), and `side-position-interface` (page 740).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.112 ScriptColumn

An auxiliary grob to (vertically) align stacked `Script` (page 612), grobs.

`ScriptColumn` objects are created by: `Non_musical_script_column_engraver` (page 438), and `Script_column_engraver` (page 445).

Standard settings:

before-line-breaking (boolean):
 ly:script-column::before-line-breaking
 Dummy property, used to trigger a callback function.

This object supports the following interface(s): grob-interface (page 706), item-interface (page 714), and script-column-interface (page 736).

This object is of class Item (characterized by item-interface (page 714)).

3.1.113 ScriptRow

An auxiliary grob to horizontally align stacked Script (page 612), grobs.

ScriptRow objects are created by: Script_row_engraver (page 445).

Standard settings:

before-line-breaking (boolean):
 ly:script-column::row-before-line-breaking
 Dummy property, used to trigger a callback function.

This object supports the following interface(s): grob-interface (page 706), item-interface (page 714), and script-column-interface (page 736).

This object is of class Item (characterized by item-interface (page 714)).

3.1.114 SectionLabel

A section label, for example ‘Coda’.

SectionLabel objects are created by: Mark_engraver (page 432).

Standard settings:

after-line-breaking (boolean):
 ly:side-position-interface::move-to-extremal-staff
 Dummy property, used to trigger callback for after-line-breaking.

baseline-skip (dimension, in staff space):
 2
 Distance between base lines of multiple lines of text.

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 #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):

`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.

`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):

`1450`

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):

`-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.

`stencil` (stencil):

`ly:text-interface::print`

The symbol to print.

`vertical-skylines` (pair of skylines):

`#<unpure-pure-container #<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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-alignable-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `section-label-interface` (page 737), `self-alignment-interface` (page 738), `side-position-interface` (page 740), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.115 SegnoMark

A segno mark (created with `\repeat segno`, not with `\segno`).

SegnoMark objects are created by: `Mark_engraver` (page 432).

Standard settings:

`after-line-breaking` (boolean):

```
ly:side-position-interface::move-to-extremal-staff
```

Dummy property, used to trigger callback for `after-line-breaking`.

`baseline-skip` (dimension, in staff space):

```
2
```

Distance between base lines of multiple lines of text.

`break-align-symbols` (list):

```
'(staff-bar key-signature clef)
```

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):

1400

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 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 #<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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _)>>`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `break-alignable-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `mark-interface` (page 722), `outside-staff-interface` (page 732), `segno-mark-interface` (page 738), `self-alignment-interface` (page 738), `side-position-interface` (page 740), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.116 SignumRepetitionis

`SignumRepetitionis` objects are created by: `Signum_repetitionis_engraver` (page 446).

Standard settings:

`bar-extent` (pair of numbers):

`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):

`'signum-repetitionis`

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::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):

`#<procedure 7f3393ccd0c0 at ice-9/eval.scm:333:13 (a)>`

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 *not* influenced by changes to *Staff.StaffSymbol.thickness*).

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*.

rounded (boolean):

#f

Decide whether lines should be drawn rounded or not.

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 *not* influenced by changes to *Staff.StaffSymbol.thickness*).

space-alist (alist, with symbols as keys):

```
'((ambitus extra-space . 1.0)
  (time-signature extra-space . 0.75)
  (custos minimum-space . 2.0)
  (clef extra-space . 1.0)
  (key-signature extra-space . 1.0)
  (key-cancellation extra-space . 1.0)
  (first-note extra-space . 0.5)
  (next-note semi-fixed-space . 0.9)
  (signum-repetitionis extra-space . 0.5)
  (staff-bar extra-space . 0.5)
  (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.

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 #<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): `break-aligned-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `pure-from-neighbor-interface` (page 735), and `signum-repetitionis-interface` (page 742).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.117 Slur

A slur. See also `PhrasingSlur` (page 604).

Slur objects are created by: `Slur_engraver` (page 447).

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: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` (alist, with symbols as keys):

```
'((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))
```

Alist 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.

`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):

```
#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-stencil (> #<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 #<procedure ly:slur::height (_)> #<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): `bezier-curve-interface` (page 688), `grob-interface` (page 706), `outside-staff-interface` (page 732), `slur-interface` (page 743), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.118 `SostenutoPedal`

A `sostenuto pedal` mark. See also `SostenutoPedalLineSpanner` (page 624), `PianoPedalBracket` (page 605), `SustainPedal` (page 640), and `UnaCordaPedal` (page 666).

`SostenutoPedal` objects are created by: `Piano_pedal_engraver` (page 442).

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):

#f

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 #<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 #<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): `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `piano-pedal-script-interface` (page 734), `self-alignment-interface` (page 738), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.119 SostenutoPedalLineSpanner

An auxiliary grob providing a baseline to align consecutive `SostenutoPedal` (page 623), grobs vertically.

`SostenutoPedalLineSpanner` objects are created by: `Piano_pedal_align_engraver` (page 442).

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 #<procedure ly:grob::vertical-skylines-from-
element-stencils (> #<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 #<procedure ly:axis-group-interface::height
(> #<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 #<procedure ly:side-position-interface::y-
aligned-side (_ #:optional _)> #<procedure ly:side-position-
interface::pure-y-aligned-side (_ _ #:optional _)> >
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `axis-group-interface` (page 680), `grob-interface` (page 706), `outside-staff-interface` (page 732), `piano-pedal-interface` (page 734), `side-position-interface` (page 740), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.120 SpacingSpanner

An auxiliary grob to set all horizontal spacing constraints across a score. There is normally one such grob for the whole score, but there can be several if `\newSpacingSection` is used. See also `GraceSpacing` (page 553), `NoteSpacing` (page 597), and `StaffSpacing` (page 632).

SpacingSpanner objects are created by: `Spacing_engraver` (page 447).

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): `grob-interface` (page 706), `spacing-options-interface` (page 746), `spacing-spanner-interface` (page 746), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.121 SpanBar

A span bar, i.e., the parts of a multi-staff bar line that are outside of staves. See also `SpanBarStub` (page 627).

`SpanBar` objects are created by: `Span_bar_engraver` (page 448).

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 #<procedure ly:axis-group-interface::height (_)> #<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-anchor` (number):

`ly:span-bar::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*.

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): bar-line-interface (page 683), break-aligned-interface (page 689), font-interface (page 700), grob-interface (page 706), item-interface (page 714), and span-bar-interface (page 747).

This object is of class Item (characterized by item-interface (page 714)).

3.1.122 SpanBarStub

An auxiliary grob, acting like a fake SpanBar (page 626), grob in contexts such as Lyrics (page 199), that are crossed by a span bar, to keep span bars taking horizontal space.

SpanBarStub objects are created by: Span_bar_stub_engraver (page 448).

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 7f3393ce4560 at ice-9/eval.scm:333:13 (a)>

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 (a b c)> >
```

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 706), `item-interface` (page 714), and `pure-from-neighbor-interface` (page 735).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.123 StaffEllipsis

A visual marker (usually three consecutive dots) to indicate that typesetting of music is skipped.

`StaffEllipsis` objects are created by: `Skip_typesetting_engraver` (page 446).

Standard settings:

`break-align-symbol` (symbol):

```
'staff-ellipsis
```

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.

`layer` (integer):

```
1
```

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`.

`space-alist` (alist, with symbols as keys):

```
'((ambitus extra-space . 1.0)
 (breathing-sign extra-space . 1.0)
 (custos extra-space . 1.0)
 (key-signature extra-space . 1.0)
 (time-signature extra-space . 1.0)
 (signum-repetitionis extra-space . 1.0)
 (staff-bar extra-space . 1.0)
 (clef extra-space . 1.0)
 (cue-clef extra-space . 1.0)
 (cue-end-clef extra-space . 1.0)
 (first-note extra-space . 1.0)
 (right-edge fixed-space . 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*):

staff-ellipsis::print

The symbol to print.

text (*markup*):

```
'(#<procedure line-markup (a b c)>
  ((#<procedure null-markup (a b)>))
  (#<procedure musicglyph-markup (a b c)>
   "dots.dot")
  (#<procedure musicglyph-markup (a b c)>
   "dots.dot")
  (#<procedure musicglyph-markup (a b c)>
   "dots.dot"))
```

```
(#<procedure null-markup (a b)>))
```

Text markup. See Section “Formatting text” in *Notation Reference*.

`whiteout` (boolean-or-number):

```
#t
```

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 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 line-thickness. The shape of the background is determined by `whiteout-style`. Usually `#f` by default.

`Y-extent` (pair of numbers):

```
staff-ellipsis::calc-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): `break-aligned-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.124 StaffGrouper

An auxiliary grob to manage vertical spacing of staff groups. See also `VerticalAlignment` (page 669), and `VerticalAxisGroup` (page 670).

`StaffGrouper` objects are created by: `Vertical_align_engraver` (page 456).

Standard settings:

`staff-staff-spacing` (alist, with symbols as keys):

```
'((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 (alist, with symbols as keys):

```
'((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): grob-interface (page 706), spanner-interface (page 748), and staff-grouper-interface (page 749).

This object is of class Spanner (characterized by spanner-interface (page 748)).

3.1.125 StaffHighlight

A colored span to highlight a music passage.

StaffHighlight objects are created by: Staff_highlight_engraver (page 449).

Standard settings:

bound-prefatory-paddings (pair of numbers):

```
'(0.5 . 0.5)
```

For a highlight, the amount of padding to insert at a bound from a prefatory item that is not a bar line.

color (color):

```
#<procedure 7f3393cfb3e0 at ice-9/eval.scm:333:13 (a)>
```

The color of this grob.

layer (integer):

```
-1
```

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.

shorten-pair (pair of numbers):

```
'(0 . 0)
```

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):

```
staff-highlight::print
```

The symbol to print.

X-extent (pair of numbers):

```
staff-highlight::width
```

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

Y-extent (pair of numbers):

```
staff-highlight::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): `grob-interface` (page 706), `spanner-interface` (page 748), and `staff-highlight-interface` (page 749).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.126 StaffSpacing

An auxiliary grob to handle spacing within a staff. See also `NoteSpacing` (page 597), `GraceSpacing` (page 553), and `SpacingSpanner` (page 625).

`StaffSpacing` objects are created by: `Separating_line_group_engraver` (page 446).

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): `grob-interface` (page 706), `item-interface` (page 714), `spacing-interface` (page 746), and `staff-spacing-interface` (page 750).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.127 StaffSymbol

A staff symbol, usually five horizontal lines.

`StaffSymbol` objects are created by: `Staff_symbol_engraver` (page 449), and `Tab_staff_symbol_engraver` (page 452).

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.

widened-extent (pair of numbers):

staff-symbol::calc-widened-extent

The vertical extent that a bar line on a certain staff symbol should have. If the staff symbol is small (e.g., has just one line, as in a `RhythmicStaff`, this is wider than the staff symbol's Y extent.

Y-extent (pair of numbers):

#<unpure-pure-container #<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): `grob-interface` (page 706), `spanner-interface` (page 748), and `staff-symbol-interface` (page 750).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.128 StanzaNumber

A stanza number (or markup) for lyrics.

`StanzaNumber` objects are created by: `Stanza_number_engraver` (page 450).

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):

'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):

#<unpure-pure-container #<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): `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `side-position-interface` (page 740), `stanza-number-interface` (page 751), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.129 Stem

A stem. See also `StemStub` (page 636).

Stem objects are created by: `Span_stem_engraver` (page 448), and `Stem_engraver` (page 450).

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` (alist, with symbols as keys):

`'((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))`

Alist 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 #<procedure ly:stem::calc-length (>
#<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 #<procedure ly:stem::calc-stem-begin-position
(> #<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 #<procedure ly:stem::height (> #<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 #<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): *grob-interface* (page 706), *item-interface* (page 714), and *stem-interface* (page 751).

This object is of class *Item* (characterized by *item-interface* (page 714)).

3.1.130 StemStub

An auxiliary grob that prevents cross-staff Stem (page 634), grobs from colliding with articulations.

StemStub objects are created by: Stem_engraver (page 450).

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):

#<unpure-pure-container #f #<procedure stem-stub::pure-height (a b c)>>

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): grob-interface (page 706), and item-interface (page 714).

This object is of class Item (characterized by item-interface (page 714)).

3.1.131 StemTremolo

A stem tremolo.

StemTremolo objects are created by: Stem_engraver (page 450).

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 #<procedure ly:grob::stencil-height (_)>`
`#<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 #<procedure ly:stem-tremolo::calc-y-offset (_)>`
`#<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): `grob-interface` (page 706), `item-interface` (page 714), `self-alignment-interface` (page 738), and `stem-tremolo-interface` (page 753).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.132 StringNumber

A markup (by default a digit in a circle) to name a string.

`StringNumber` objects are created by: `New_fingering_engraver` (page 437).

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`.

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-features (list):

('cv47')

Opentype features.

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 `arabic`, `roman-ij-lower`, `roman-ij-upper`, `roman-lower`, and `roman-upper`.

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):`
`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 #<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): `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `number-interface` (page 730), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), `string-number-interface` (page 754), `text-interface` (page 757), and `text-script-interface` (page 758).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.133 StrokeFinger

A markup (usually a lowercase letter) to indicate right-hand fingering. See also *Fingering* (page 545).

StrokeFinger objects are created by: `New_fingering_engraver` (page 437).

Standard settings:

`add-stem-support (boolean):`
`only-if-beamed`
 If set, the Stem object is included in this script’s support.

`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 #<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): `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), `stroke-finger-interface` (page 754), `text-interface` (page 757), and `text-script-interface` (page 758).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.134 SustainPedal

A sustain pedal mark. See also `SustainPedalLineSpanner` (page 641), `PianoPedalBracket` (page 605), `SostenutoPedal` (page 623), and `UnaCordaPedal` (page 666).

`SustainPedal` objects are created by: `Piano_pedal_engraver` (page 442).

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):
#f

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:sustain-pedal::print
The symbol to print.

vertical-skylines (pair of skylines):
#<unpure-pure-container #<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 #<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): font-interface (page 700), grob-interface (page 706), item-interface (page 714), piano-pedal-interface (page 734), piano-pedal-script-interface (page 734), self-alignment-interface (page 738), and text-interface (page 757).

This object is of class Item (characterized by item-interface (page 714)).

3.1.135 SustainPedalLineSpanner

An auxiliary grob providing a baseline to align consecutive SustainPedal (page 640), grobs vertically.

SustainPedalLineSpanner objects are created by: Piano_pedal_align_engraver (page 442).

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 #<procedure ly:grob::vertical-skylines-from-
element-stencils (> #<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 #<procedure ly:axis-group-interface::height
(> #<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 #<procedure ly:side-position-interface::y-
aligned-side (> #:optional > #<procedure ly:side-position-
interface::pure-y-aligned-side (> > #:optional >
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `axis-group-interface` (page 680), `grob-interface` (page 706), `outside-staff-interface` (page 732), `piano-pedal-interface` (page 734), `side-position-interface` (page 740), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.136 System

The top-level grob of a score. All other grobs are descendants of it.

System objects are created internally by the `Score_engraver` translator group..

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.

`show-vertical-skylines` (boolean):

`grob::show-skylines-if-debug-skylines-set`

If true, print this grob's vertical skylines. This is meant for debugging purposes.

`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):

`#<unpure-pure-container #<procedure ly:system::height (>)> #<procedure 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): `axis-group-interface` (page 680), `grob-interface` (page 706), `outside-staff-axis-group-interface` (page 731), `spanner-interface` (page 748), and `system-interface` (page 755).

This object is of class `System` (characterized by `system-interface` (page 755)).

3.1.137 `SystemStartBar`

A bar line as a system start delimiter.

`SystemStartBar` objects are created by: `System_start_delimiter_engraver` (page 450).

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): `grob-interface` (page 706), `side-position-interface` (page 740), `spanner-interface` (page 748), and `system-start-delimiter-interface` (page 755).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.138 SystemStartBrace

A brace as a system start delimiter.

SystemStartBrace objects are created by: `System_start_delimiter_engraver` (page 450).

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.

`stencil` (stencil):

`ly:system-start-delimiter::print`

The symbol to print.

`style` (symbol):

'brace

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`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): `font-interface` (page 700), `grob-interface` (page 706), `side-position-interface` (page 740), `spanner-interface` (page 748), and `system-start-delimiter-interface` (page 755).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.139 SystemStartBracket

A bracket as a system start delimiter.

SystemStartBracket objects are created by: `System_start_delimiter_engraver` (page 450).

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 *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): *font-interface* (page 700), *grob-interface* (page 706), *side-position-interface* (page 740), *spanner-interface* (page 748), and *system-start-delimiter-interface* (page 755).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.140 SystemStartSquare

A rectangle-like bracket as a start delimiter.

SystemStartSquare objects are created by: *System_start_delimiter_engraver* (page 450).

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


```
#<procedure parenthesize-stencil (a b c d e)>>
(width . 0.25))
(repeat-tied-properties
 (note-head-visible . #t)
 (parenthesize . #t))
 (tied-properties (parenthesize . #t)))
```

Alist 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 `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

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.

stem-attachment (pair of numbers):

ly:note-head::calc-tab-stem-attachment

An (x . y) pair where the stem attaches to the notehead.

stencil (stencil):

tab-note-head::print

The symbol to print.

whiteout (boolean-or-number):

#t

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 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 line-thickness. The shape of the background is determined by `whiteout-style`. Usually #f by default.

X-offset (number):

`ly:self-alignment-interface::x-aligned-on-self`

The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):

`#<unpure-pure-container #<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 #<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): `bend-interface` (page 687), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `note-head-interface` (page 729), `rhythmic-grob-interface` (page 736), `rhythmic-head-interface` (page 736), `staff-symbol-referencer-interface` (page 751), `tab-note-head-interface` (page 756), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.142 TextMark

An arbitrary textual mark. See also `SectionLabel` (page 614), and `JumpScript` (page 561), for grobs with a more specific intent.

`TextMark` objects are created by: `Text_mark_engraver` (page 452).

Standard settings:

`after-line-breaking` (boolean):

`ly:side-position-interface::move-to-extremal-staff`

Dummy property, used to trigger callback for `after-line-breaking`.

`baseline-skip` (dimension, in staff space):

2

Distance between base lines of multiple lines of text.

`break-align-symbols` (list):

`'(staff-bar key-signature clef)`

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):

`text-mark-interface::calc-break-visibility`

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):

```
0.5
```

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.

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):

```
1250
```

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):

```
text-mark-interface::calc-self-alignment-X
```

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.

text (markup):

```
#<procedure 7f3393d3bd20 at ice-9/eval.scm:333:13 (a)>
```

Text markup. See Section “Formatting text” in *Notation Reference*.

vertical-skylines (pair of skylines):

```
#<unpure-pure-container #<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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `accidental-switch-interface` (page 678), `break-alignable-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `mark-interface` (page 722), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), `text-interface` (page 757), and `text-mark-interface` (page 758).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.143 TextScript

A markup attached to a grob like a note head. See also `MultiMeasureRestText` (page 591).

TextScript objects are created by: `Text_engraver` (page 452).

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`.

`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 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):

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):

#f

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):

#f

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 #<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 #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `accidental-switch-interface` (page 678), `font-interface` (page 700), `grob-interface` (page 706), `instrument-specific-markup-interface` (page 712), `item-interface` (page 714), `outside-staff-interface` (page 732), `self-alignment-interface` (page 738), `side-position-interface` (page 740), `text-interface` (page 757), and `text-script-interface` (page 758).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.144 TextSpanner

Text like 'rit', usually followed by a (dashed) line. See also `DynamicTextSpanner` (page 541).

`TextSpanner` objects are created by: `Text_spanner_engraver` (page 453).

Standard settings:

`bound-details` (alist, with symbols as keys):

```
'((left (padding . 0.25) (attach-dir . -1))
  (left-broken (attach-dir . 1))
  (right (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` (alist, with symbols as keys):

`ly:horizontal-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` (alist, with symbols as keys):

`ly:horizontal-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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `font-interface` (page 700), `grob-interface` (page 706), `horizontal-line-spanner-interface` (page 712), `line-interface` (page 718), `line-spanner-interface` (page 719), `outside-staff-interface` (page 732), `side-position-interface` (page 740), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.145 Tie

A tie. See also `TieColumn` (page 656), `LaissezVibrerTie` (page 569), and `RepeatTie` (page 609).

Tie objects are created by: `Completion_heads_engraver` (page 414), and `Tie_engraver` (page 453).

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` (alist, with symbols as keys):

```
'((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)
  (intra-space-threshold . 1.25)
  (outer-tie-vertical-distance-symmetry-penalty-factor
   .
   10)
  (outer-tie-length-symmetry-penalty-factor . 10)
  (vertical-distance-penalty-factor . 7)
  (outer-tie-vertical-gap . 0.25)
  (multi-tie-region-size . 3)
  (single-tie-region-size . 4)
  (between-length-limit . 1.0))
```

Alist 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.

`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 #<procedure ly:grob::vertical-skylines-from-
stencil (_)> #<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): `bezier-curve-interface` (page 688), `grob-interface` (page 706), `spanner-interface` (page 748), and `tie-interface` (page 759).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.146 TieColumn

An auxiliary grob to determine direction and shape of stacked Tie (page 654), grobs.

TieColumn objects are created by: `Completion_heads_engraver` (page 414), and `Tie_engraver` (page 453).

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):

#f

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):

#f

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 706), `spanner-interface` (page 748), and `tie-column-interface` (page 758).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.147 TimeSignature

A time signature.

TimeSignature objects are created by: `Time_signature_engraver` (page 454).

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 (alist, with symbols as keys):

```
'((ambitus extra-space . 1.0)
  (cue-clef extra-space . 1.5)
  (first-note fixed-space . 2.0)
  (right-edge extra-space . 0.5)
  (signum-repetitionis extra-space . 1.0)
  (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 #<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): `break-aligned-interface` (page 689), `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `pure-from-neighbor-interface` (page 735), and `time-signature-interface` (page 761).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.148 TrillPitchAccidental

The accidental of a pitched trill. See also `TrillPitchGroup` (page 660).

`TrillPitchAccidental` objects are created by: `Pitched_trill_engraver` (page 443).

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 (string):`

`accidental-interface::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.

`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 #<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): accidental-interface (page 676), accidental-switch-interface (page 678), font-interface (page 700), grob-interface (page 706), inline-accidental-interface (page 712), item-interface (page 714), side-position-interface (page 740), and trill-pitch-accidental-interface (page 762).

This object is of class Item (characterized by item-interface (page 714)).

3.1.149 TrillPitchGroup

An auxiliary grob to construct a pitched trill, aligning TrillPitchAccidental (page 659), TrillPitchParentheses (page 662), and TrillPitchHead (page 661), horizontally. See also TrillSpanner (page 662).

TrillPitchGroup objects are created by: Pitched_trill_engraver (page 443).

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.

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.

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.

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 #<procedure ly:axis-group-interface::height
(_)> #<procedure trill-pitch-group::pure-height (a b c)> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 680), `grob-interface` (page 706), `item-interface` (page 714), and `side-position-interface` (page 740).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.150 TrillPitchHead

The note head of a pitched trill. See also `TrillPitchGroup` (page 660).

`TrillPitchHead` objects are created by: `Pitched_trill_engraver` (page 443).

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.

`parenthesis-friends` (list):

'(accidental-grob)

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:note-head::print`

The symbol to print.

Y-extent (pair of numbers):

`#<unpure-pure-container #<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 #<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): `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `ledgered-interface` (page 717), `pitched-trill-interface` (page 734), `rhythmic-head-interface` (page 736), and `staff-symbol-referencer-interface` (page 751).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.151 TrillPitchParentheses

The parentheses of a pitched trill. See also `TrillPitchGroup` (page 660).

`TrillPitchParentheses` objects are created by: `Pitched_trill_engraver` (page 443).

Standard settings:

`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):

0.3

Add this much extra space between objects that are next to each other.

`stencil` (stencil):

`parentheses-interface::print`

The symbol to print.

`stencils` (list):

`parentheses-interface::calc-parenthesis-stencils`

Multiple stencils, used as intermediate value.

`Y-extent` (pair of numbers):

`#<unpure-pure-container #<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): `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `parentheses-interface` (page 733), and `pitched-trill-interface` (page 734).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.152 TrillSpanner

A continued trill with a wiggly line (created with `\startTrillSpan`, not with `\trill`). See also `TrillPitchGroup` (page 660).

`TrillSpanner` objects are created by: `Trill_spanner_engraver` (page 455).

Standard settings:

`after-line-breaking` (boolean):

`ly:spanner::kill-zero-spanned-time`

Dummy property, used to trigger callback for after-line-breaking.

`bound-details` (alist, with symbols as keys):

`'((left (text #<procedure with-true-dimension-markup (a b c d)>`

0

```

        (#<procedure musicglyph-markup (a b c)>
         "scripts.trill"))
      (stencil-offset 0 . -1)
      (attach-dir . 0))
    (left-broken (end-on-note . #t))
    (right (adjust-on-neighbor . #t)
           (attach-dir . -1)
           (end-on-accidental . #t)))

```

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 (alist, with symbols as keys):`

ly:horizontal-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 (alist, with symbols as keys):`

ly:horizontal-line-spanner::calc-right-bound-info

An alist of properties for determining attachments of spanners to edges.

`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.

`to-barline (boolean):`

#t

If true, the spanner will stop at the bar line just before it would otherwise stop.

This object supports the following interface(s): font-interface (page 700), grob-interface (page 706), horizontal-line-spanner-interface (page 712),

line-interface (page 718), line-spanner-interface (page 719), outside-staff-interface (page 732), side-position-interface (page 740), spanner-interface (page 748), and trill-spanner-interface (page 762).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.153 TupletBracket

A tuplet bracket. See also `TupletNumber` (page 665).

`TupletBracket` objects are created by: `Tuplet_engraver` (page 456).

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 (*start* . *end*), where *start* and *end* are vertical positions 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):
  #f
  Draw a slur instead of a bracket for tuplets.
```

```
vertical-skylines (pair of skylines):
  #<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-
  stencil (_) #<procedure ly:grob::pure-simple-vertical-skylines-from-
  extents ( _ _ )> >
  Two skylines, one above and one below this grob.
```

```
visible-over-note-heads (boolean):
  #f
  This prints a tuplet bracket when the bracket is set to be over the note heads. This
  option can be combined with the default tuplet bracket visibility style and with
  #'if-no-beam.
```

```
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): *grob-interface* (page 706), *line-interface* (page 718), *outside-staff-interface* (page 732), *spanner-interface* (page 748), and *tuplet-bracket-interface* (page 762).

This object is of class *Spanner* (characterized by *spanner-interface* (page 748)).

3.1.154 TupletNumber

A tuplet number. See also *TupletBracket* (page 664).

TupletNumber objects are created by: *Tuplet_engraver* (page 456).

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):

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): `font-interface` (page 700), `grob-interface` (page 706), `outside-staff-interface` (page 732), `spanner-interface` (page 748), `text-interface` (page 757), and `tuplet-number-interface` (page 764).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.155 UnaCordaPedal

An una corda pedal mark. See also `UnaCordaPedalLineSpanner` (page 667), `SostenutoPedal` (page 623), `SustainPedal` (page 640), and `PianoPedalBracket` (page 605).

`UnaCordaPedal` objects are created by: `Piano_pedal_engraver` (page 442).

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):

`#f`

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 #<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 #<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): `font-interface` (page 700), `grob-interface` (page 706), `item-interface` (page 714), `piano-pedal-script-interface` (page 734), `self-alignment-interface` (page 738), and `text-interface` (page 757).

This object is of class `Item` (characterized by `item-interface` (page 714)).

3.1.156 UnaCordaPedalLineSpanner

An auxiliary grob providing a baseline to align consecutive `UnaCordaPedal` (page 666), grobs vertically.

UnaCordaPedalLineSpanner objects are created by: `Piano_pedal_align_engraver` (page 442).

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 #<procedure ly:grob::vertical-skylines-from-
element-stencils (> #<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 #<procedure ly:axis-group-interface::height
(> #<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 #<procedure ly:side-position-interface::y-aligned-side (_ #:optional _)> #<procedure ly:side-position-interface::pure-y-aligned-side (_ _ _ #:optional _)>>
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): `axis-group-interface` (page 680), `grob-interface` (page 706), `outside-staff-interface` (page 732), `piano-pedal-interface` (page 734), `side-position-interface` (page 740), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.157 `VaticanaLigature`

A grob to display a melisma (ligature) as used in Gregorian chant. See also `KievanLigature` (page 568), `MensuralLigature` (page 584), and `LigatureBracket` (page 573).

`VaticanaLigature` objects are created by: `Vaticana_ligature_engraver` (page 456).

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): `font-interface` (page 700), `grob-interface` (page 706), `spanner-interface` (page 748), and `vaticana-ligature-interface` (page 764).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.158 `VerticalAlignment`

A top-level auxiliary grob to stack groups (staves, lyrics lines, etc.). See also `StaffGrouper` (page 630), and `VerticalAxisGroup` (page 670).

`VerticalAlignment` objects are created by: `Vertical_align_engraver` (page 456).

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):

`#<unpure-pure-container #<procedure ly:axis-group-interface::height
(_)> #<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): `align-interface` (page 678), `axis-group-interface` (page 680), `grob-interface` (page 706), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.159 VerticalAxisGroup

An auxiliary grob to group everything contained in a context like `Staff` (page 287), `Lyrics` (page 199), `Dynamics` (page 127), etc. See also `StaffGrouper` (page 630), and `VerticalAlignment` (page 669).

`VerticalAxisGroup` objects are created by: `Axis_group_engraver` (page 404).

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` (alist, with symbols as keys):

`'((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.

`show-vertical-skylines` (boolean):

`grob::show-skylines-if-debug-skylines-set`

If true, print this grob's vertical skylines. This is meant for debugging purposes.

`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` (alist, with symbols as keys):

```
#<unpure-pure-container #<procedure ly:axis-group-interface::calc-
staff-staff-spacing (> #<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).

`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 #<procedure ly:hara-kiri-group-spanner::y-
extent (> #<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): `axis-group-interface` (page 680), `grob-interface` (page 706), `hara-kiri-group-spanner-interface` (page 710), `outside-staff-axis-group-interface` (page 731), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.160 VoiceFollower

A line to indicate staff changes of a voice.

VoiceFollower objects are created by: `Note_head_line_engraver` (page 438).

Standard settings:

after-line-breaking (boolean):

ly:spanner::kill-zero-spanned-time

Dummy property, used to trigger callback for after-line-breaking.

bound-details (alist, with symbols as keys):

```
'((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 (alist, with symbols as keys):

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 (alist, with symbols as keys):

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.

This object supports the following interface(s): `grob-interface` (page 706), `line-interface` (page 718), `line-spanner-interface` (page 719), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.161 VoltaBracket

A volta bracket. See also VoltaBracketSpanner (page 674).

VoltaBracket objects are created by: Volta_engraver (page 457).

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-features (list):

'("cv47" "ss01")

OpenType features.

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 #<procedure ly:grob::vertical-skylines-from-
stencil (_) > #<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 #<procedure ly:grob::stencil-height (_) >
#<procedure volta-bracket-interface::pure-height (a b c) > >
```

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): font-interface (page 700), grob-interface (page 706), horizontal-bracket-interface (page 711), line-interface (page 718), side-position-interface (page 740), spanner-interface (page 748), text-interface (page 757), volta-bracket-interface (page 765), and volta-interface (page 765).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.1.162 VoltaBracketSpanner

An auxiliary grob providing a baseline to align consecutive `VoltaBracket` (page 673), grobs vertically.

`VoltaBracketSpanner` objects are created by: `Volta_engraver` (page 457).

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.

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):

```
#<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-
element-stencils (> #<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 #<procedure ly:axis-group-interface::height
(> #<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 #<procedure ly:side-position-interface::y-
aligned-side (_ #:optional _)> #<procedure ly:side-position-
interface::pure-y-aligned-side (_ _ #:optional _)> >
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): axis-group-interface (page 680), grob-interface (page 706), outside-staff-interface (page 732), side-position-interface (page 740), spanner-interface (page 748), and volta-interface (page 765).

This object is of class Spanner (characterized by spanner-interface (page 748)).

3.1.163 VowelTransition

A vowel transition in lyrics. See also LyricHyphen (page 575).

VowelTransition objects are created by: Hyphen_engraver (page 427).

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 (alist, with symbols as keys):

```
'((left (padding . 0.14) (attach-dir . 1))
(right-broken (padding . 0))
(left-broken (padding . 0))
```

```
(right (padding . 0.14)
      (attach-dir . -1)
      (arrow . #t)))
```

An alist of properties for determining attachments of spanners to edges.

`left-bound-info` (alist, with symbols as keys):

```
ly:horizontal-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` (alist, with symbols as keys):

```
ly:horizontal-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 #<procedure ly:grob::vertical-skylines-from-
stencil (_) > #<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): `grob-interface` (page 706), `horizontal-line-spanner-interface` (page 712), `line-interface` (page 718), `line-spanner-interface` (page 719), `lyric-interface` (page 722), and `spanner-interface` (page 748).

This object is of class `Spanner` (characterized by `spanner-interface` (page 748)).

3.2 Graphical Object Interfaces

3.2.1 accidental-interface

A single accidental.

User settable properties:

`alteration` (number)

Alteration numbers for accidental.

`alteration-glyph-name-alist` (association list (list of pairs))

An alist of key-string pairs.

`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.

`hide-tied-accidental-after-break` (boolean)

If set, an accidental that appears on a tied note after a line break will not be displayed.

`restore-first` (boolean)

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): `Accidental` (page 475), `AccidentalCautionary` (page 476), `AccidentalSuggestion` (page 478), `AmbitusAccidental` (page 481), and `TrillPitchAccidental` (page 659).

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` (association list (list of pairs))

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): `AccidentalPlacement` (page 477).

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): `AccidentalSuggestion` (page 478).

3.2.4 accidental-switch-interface

Any object that prints one or several accidentals based on alterations.

User settable properties:

`alteration-glyph-name-alist` (association list (list of pairs))

An alist of key-string pairs.

This grob interface is used in the following graphical object(s): `Accidental` (page 475), `AccidentalCautionary` (page 476), `AccidentalSuggestion` (page 478), `AmbitusAccidental` (page 481), `BalloonText` (page 485), `BassFigure` (page 491), `ChordName` (page 508), `CombineTextScript` (page 517), `GridChordName` (page 553), `HorizontalBracketText` (page 558), `InstrumentName` (page 559), `InstrumentSwitch` (page 560), `KeyCancellation` (page 563), `KeySignature` (page 566), `MeasureSpanner` (page 583), `NoteName` (page 597), `RehearsalMark` (page 607), `TextMark` (page 649), `TextScript` (page 651), and `TrillPitchAccidental` (page 659).

3.2.5 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` (association list (list of pairs))

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): `BassFigureAlignment` (page 492), and `VerticalAlignment` (page 669).

3.2.6 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): `Ambitus` (page 479), `AmbitusLine` (page 482), and `AmbitusNoteHead` (page 482).

3.2.7 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 (*start* . *end*), where *start* and *end* are vertical positions 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): Arpeggio (page 483).

3.2.8 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`).

nonstaff-nonstaff-spacing (alist, with symbols as keys)

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 (alist, with symbols as keys)

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` (alist, with symbols as keys)

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` (alist, with symbols as keys)

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): Ambitus (page 479), BassFigureAlignment (page 492), BassFigureAlignmentPositioning (page 492), BassFigureLine (page 494), BreakAlignGroup (page 500), BreakAlignment (page 501), CenteredBarNumberLineSpanner (page 507), DotColumn (page 531), DynamicLineSpanner (page 538), NonMusicalPaperColumn (page 593), NoteCollision (page 594), NoteColumn (page 595), PaperColumn (page 599), SostenuatoPedalLineSpanner (page 624), SustainPedalLineSpanner (page 641), System (page 643), TrillPitchGroup (page 660), UnaCordaPedalLineSpanner (page 667), VerticalAlignment (page 669), VerticalAxisGroup (page 670), and VoltaBracketSpanner (page 674).

3.2.9 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*.

text-alignment-X (number)

How to align an annotation horizontally.

text-alignment-Y (number)

How to align an annotation vertically.

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*).

X-attachment (number)

Horizontal attachment of a line on a frame, typically between -1 (left) and 1 (right).

Y-attachment (number)

Vertical attachment of a line on a frame, typically between -1 (down) and 1 (up).

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): `BalloonText` (page 485), and `Footnote` (page 549).

3.2.10 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-left` (string)

The glyph value to use at the end of the line when the line is broken. `#f` indicates that no glyph should be visible; otherwise the value must be a string.

`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-right` (string)

The glyph value to use at the beginning of the line when the line is broken. `#f` indicates that no glyph should be visible; otherwise the value must be a string.

`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): `BarLine` (page 486), and `SpanBar` (page 626).

3.2.11 bar-number-interface

A bar number or bar number vertical support object.

This grob interface is used in the following graphical object(s): `BarNumber` (page 489), `CenteredBarNumber` (page 506), and `CenteredBarNumberLineSpanner` (page 507).

3.2.12 bass-figure-alignment-interface

Align a bass figure.

This grob interface is used in the following graphical object(s): `BassFigureAlignment` (page 492).

3.2.13 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): `BassFigure` (page 491).

3.2.14 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 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:

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` (alist, with symbols as keys)

Alist 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-quantz` (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.

`neutral-direction` (direction)

Which direction to take in the center of the staff.

`positions` (pair of numbers)

Pair of staff coordinates (*start* . *end*), where *start* and *end* are vertical positions 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:

`annotation` (string)

Annotate a grob for debug purposes.

`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.

This grob interface is used in the following graphical object(s): Beam (page 495).

3.2.15 bend-after-interface

A doit or drop.

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:

delta-position (number)

The vertical position difference.

This grob interface is used in the following graphical object(s): BendAfter (page 497).

3.2.16 bend-interface

The (curved) line representing a bent string. Available for the 'style property are 'hold, 'pre-bend and 'pre-bend-hold. The following properties may be set in the details list.

arrow-stencil

The stencil procedure for the BendSpanner arrow head.

curvature-factor

Determines the horizontal part of a bend arrow as percentage of the total horizontal extent, usually between 0 and 1.

bend-arrowhead-height

The height of the arrow head.

bend-arrowhead-width

The width of the arrow head.

bend-amount-strings

An alist with entries for 'quarter, 'half, 'three-quarter and 'full, which are used to print how much a string is bent.

curve-x-padding-line-end

For a broken BendSpanner, set the padding at the line end to subsequent objects like changed Clef, etc.

curve-y-padding-line-end

For a broken BendSpanner started from a chord the curves don't match; there is a certain vertical gap specified by this value.

dashed-line-settings

List of three numeric values representing on, off and phase of a dashed line.

head-text-break-visibility

A vector of three booleans to set visibility of the arrow head and the text at a line break. This is important for 'style set to 'hold, 'pre-bend or 'pre-bend-hold.

horizontal-left-padding

The amount of horizontal free space between a TabNoteHead and the starting BendSpanner.

successive-level

An integer used as a factor determining the vertical coordinate of the starting BendSpanner. If successive-level is 1, the BendSpanner starts at the TabNoteHead. If consecutive BendSpanners are set this value should be set to an appropriate value for the first one; later on, this value is maintained by the engraver.

target-visibility

A boolean to decide whether the target TabNoteHead should be visible. For up-pointing bends this is usually true.

y-distance-from-tabstaff-to-arrow-tip

This numeric value determines the distance between the TabStaff and the arrow head of the BendSpanner.

User settable properties:**bend-me (boolean)**

Decide whether this grob is bent.

details (alist, with symbols as keys)

Alist 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.

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): BendSpanner (page 498), NoteColumn (page 595), NoteHead (page 596), and TabNoteHead (page 647).

3.2.17 bezier-curve-interface

A Bézier curve (tie, slur, etc.).

User settable properties:**show-control-points (boolean)**

For grobs printing Bézier curves, setting this property to true causes the control points and control polygon to be drawn on the page for ease of tweaking.

This grob interface is used in the following graphical object(s): LaissezVibrerTie (page 569), PhrasingSlur (page 604), RepeatTie (page 609), Slur (page 621), and Tie (page 654).

3.2.18 break-alignable-interface

Object that is aligned on a break alignment.

User settable properties:

`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*.

`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): `BarNumber` (page 489), `CodaMark` (page 515), `JumpScript` (page 561), `LyricRepeatCount` (page 576), `MetronomeMark` (page 585), `RehearsalMark` (page 607), `SectionLabel` (page 614), `SegnoMark` (page 616), and `TextMark` (page 649).

3.2.19 break-aligned-interface

Breakable items.

User settable properties:

`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-symbol` (symbol)

This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in *Internals Reference*.

`space-alist` (alist, with symbols as keys)

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.

This grob interface is used in the following graphical object(s): `Ambitus` (page 479), `AmbitusAccidental` (page 481), `BarLine` (page 486), `BreakAlignGroup` (page 500), `BreathingSign` (page 502), `Clef` (page 510), `CueClef` (page 521), `CueEndClef` (page 524), `Custos` (page 527), `Divisio` (page 528), `DoublePercentRepeat` (page 532), `KeyCancellation` (page 563), `KeySignature` (page 566), `LeftEdge` (page 571), `SignumRepetitionis` (page 618), `SpanBar` (page 626), `StaffEllipsis` (page 628), and `TimeSignature` (page 657).

3.2.20 break-alignment-interface

The object that performs break alignment.

Three interfaces deal specifically with break alignment:

1. `break-alignment-interface` (this one),
2. Section 3.2.18 [`break-alignable-interface`], page 689, and
3. Section 3.2.19 [`break-aligned-interface`], page 689.

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
signum-repetitionis
staff-bar
staff-ellipsis
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): `BreakAlignment` (page 501).

3.2.21 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.

`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): `BreathingSign` (page 502), and `Divisio` (page 528).

3.2.22 caesura-script-interface

A script for \caesura, e.g., an outside-staff comma or a fermata over a bar line.

This grob interface is used in the following graphical object(s): `CaesuraScript` (page 505).

3.2.23 centered-bar-number-interface

A measure-centered bar number.

This grob interface is used in the following graphical object(s): `CenteredBarNumber` (page 506).

3.2.24 centered-bar-number-line-spanner-interface

An abstract object used to align centered bar numbers on the same vertical position.

This grob interface is used in the following graphical object(s): `CenteredBarNumberLineSpanner` (page 507).

3.2.25 centered-spanner-interface

A spanner that prints a symbol centered between two columns.

User settable properties:

`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.

`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)
```

This grob interface is used in the following graphical object(s): `CenteredBarNumber` (page 506), `MeasureCounter` (page 580), and `PercentRepeat` (page 601).

3.2.26 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): `ChordName` (page 508), and `FretBoard` (page 550).

3.2.27 chord-square-interface

A chord square in a chord grid.

User settable properties:

`measure-division` (number list)

A list representing what fraction of the measure length each chord name takes in a chord square. The list is made of exact numbers between 0 and 1, which should add up to 1. Example: a measure `c2 g4 g4` results in `'(1/2 1/4 1/4)`.

`measure-division-chord-placement-alist` (association list (list of pairs))

An alist mapping measure divisions (see the `measure-division` property) to lists of coordinates (number pairs) applied to the chord names of a chord square. Coordinates are normalized between -1 and 1 within the square.

`measure-division-lines-alist` (association list (list of pairs))

An alist mapping measure divisions (see the `measure-division` property) to lists of lines to draw in the square, given as 4-element lists: `(x-start y-start x-end y-end)`.

Internal properties:

`chord-names` (array of grobs)

Array of chord names.

This grob interface is used in the following graphical object(s): `ChordSquare` (page 509).

3.2.28 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): `Clef` (page 510), `CueClef` (page 521), and `CueEndClef` (page 524).

3.2.29 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` (alist, with symbols as keys)

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): `ClefModifier` (page 513).

3.2.30 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 (*start* . *end*), where *start* and *end* are vertical positions 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): ClusterSpannerBeacon (page 515).

3.2.31 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): ClusterSpanner (page 514).

3.2.32 coda-mark-interface

A coda sign.

This grob interface is used in the following graphical object(s): CodaMark (page 515).

3.2.33 control-point-interface

A grob used to visualize one control point of a Bézier curve (such as a tie or a slur), for ease of tweaking.

Internal properties:

`bezier` (graphical (layout) object)

A pointer to a Bézier curve, for use by control points and polygons.

`index` (non-negative, exact integer)

For some grobs in a group, this is a number associated with the grob.

This grob interface is used in the following graphical object(s): ControlPoint (page 519).

3.2.34 control-polygon-interface

A grob used to visualize the control polygon of a Bézier curve (such as a tie or a slur), for ease of tweaking.

User settable properties:

`extroversion` (number)

For polygons, how the thickness of the line is spread on each side of the exact polygon with ideal zero thickness. If this is 0, the middle of line is on the polygon. If 1, the line sticks out of the polygon. If -1, the outer side of the line is exactly on the polygon. Other numeric values are interpolated.

`filled` (boolean)

Whether an object is filled with ink.

Internal properties:

`bezier` (graphical (layout) object)

A pointer to a Bézier curve, for use by control points and polygons.

This grob interface is used in the following graphical object(s): `ControlPolygon` (page 520).

3.2.35 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): `Custos` (page 527).

3.2.36 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.

`padding` (dimension, in staff space)

Add this much extra space between objects that are next to each other.

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): DotColumn (page 531).

3.2.37 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.

`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.

`style` (symbol)
This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

Internal properties:

`dot-stencil` (stencil)
The stencil for an individual dot, as opposed to a group of several dots.

This grob interface is used in the following graphical object(s): Dots (page 531).

3.2.38 duration-line-interface

A line lasting for the duration of a rhythmic event.

User settable properties:

`details` (alist, with symbols as keys)
Alist 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.

This grob interface is used in the following graphical object(s): DurationLine (page 536).

3.2.39 dynamic-interface

Any kind of loudness sign.

This grob interface is used in the following graphical object(s): `DynamicLineSpanner` (page 538), `DynamicText` (page 539), `DynamicTextSpanner` (page 541), and `Hairpin` (page 555).

3.2.40 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): `DynamicLineSpanner` (page 538).

3.2.41 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): `DynamicText` (page 539).

3.2.42 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): `DynamicTextSpanner` (page 541).

3.2.43 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): *BassFigureBracket* (page 493).

3.2.44 episema-interface

An episema line.

This grob interface is used in the following graphical object(s): *Episema* (page 543).

3.2.45 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): *BassFigureContinuation* (page 494).

3.2.46 finger-glide-interface

The line between Fingering grobs indicating a glide with that finger.

The property style may take the following symbols.

`line`

A simple connecting line.

`dashed-line`

Print a dashed line. Customizable with settings for `dash-fraction` and `dash-period`.

`dotted-line`

Print a dotted line.

`stub-right`

The printed line is limited to a certain amount right before its right bound. This amount is configurable by a suitable setting for `bound-details.right.right-stub-length`.

`stub-left`

The printed line is limited to a certain amount right after its left bound. The amount is configurable by a suitable setting for `bound-details.right.left-stub-length`.

`stub-both`

The printed line combines the settings of `stub-left` and `stub-right`.

`zigzag`

A zigzag line, configurable with suitable settings for `zigzag-width` and `zigzag-length`.

`trill`

A trill style line.

`bow`

A bow style line. The orientation of the bow may be tweaked with a suitable setting of `details.bow-direction`.

User settable properties:

`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.

`details` (alist, with symbols as keys)

Alist 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.

`style` (symbol)

This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

`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 spanner line can be constructed from a whole number of squiggles.

This grob interface is used in the following graphical object(s): `FingerGlideSpanner` (page 544).

3.2.47 finger-interface

A fingering instruction.

This grob interface is used in the following graphical object(s): Fingering (page 545).

3.2.48 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): FingeringColumn (page 547).

3.2.49 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): Flag (page 548).

3.2.50 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): Accidental (page 475), AccidentalCautionary (page 476), AccidentalSuggestion (page 478), AmbitusAccidental (page 481), AmbitusLine (page 482), AmbitusNoteHead (page 482), Arpeggio (page 483), BalloonText (page 485), BarLine (page 486), BarNumber (page 489), BassFigure (page 491), BendSpanner (page 498), BreathingSign (page 502), CaesuraScript (page 505), CenteredBarNumber (page 506), ChordName (page 508), Clef (page 510), ClefModifier (page 513), CodaMark (page 515), CombineTextScript (page 517), CueClef (page 521), CueEndClef (page 524), Custos (page 527), Divisio (page 528), Dots (page 531), DoublePercentRepeat (page 532), DoublePercentRepeatCounter (page 534), DoubleRepeatSlash (page 535), DurationLine (page 536), DynamicText (page 539), DynamicTextSpanner (page 541), Episema (page 543), Fingering (page 545), Flag (page 548), Footnote (page 549), FretBoard (page 550), GridChordName (page 553), HorizontalBracketText (page 558), InstrumentName (page 559), InstrumentSwitch (page 560), JumpScript (page 561), KeyCancellation (page 563), KeySignature (page 566), KievanLigature (page 568), LyricHyphen (page 575), LyricRepeatCount (page 576), LyricText (page 578), MeasureCounter (page 580), MeasureSpanner (page 583), MensuralLigature (page 584), MetronomeMark (page 585), MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), MultiMeasureRestText (page 591), NonMusicalPaperColumn (page 593), NoteHead (page 596), NoteName (page 597), OttavaBracket (page 598), PaperColumn (page 599), Parentheses (page 600), PercentRepeat (page 601), PercentRepeatCounter (page 602), RehearsalMark (page 607), Rest (page 611), Script (page 612), SectionLabel (page 614), SegnoMark (page 616), SignumRepetitionis (page 618), SostenuitoPedal (page 623), SpanBar (page 626), StaffEllipsis (page 628), StanzaNumber (page 633), StringNumber (page 637), StrokeFinger (page 639), SustainPedal (page 640), SystemStartBrace (page 645), SystemStartBracket (page 645), SystemStartSquare (page 646), TabNoteHead (page 647), TextMark (page 649), TextScript (page 651), TextSpanner (page 653), TimeSignature (page 657), TrillPitchAccidental (page 659), TrillPitchHead (page 661),

TrillPitchParentheses (page 662), TrillSpanner (page 662), TupletNumber (page 665), UnaCordaPedal (page 666), VaticanaLigature (page 669), and VoltaBracket (page 673).

3.2.51 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.

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): Footnote (page 549).

3.2.52 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 (alist, with symbols as keys)
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 `arabic`, `roman-ij-lower`, `roman-ij-upper`, `roman-lower`, `roman-upper`, `arabic` and `custom`. In the last 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 $\text{thickness} * (1 + \text{string-thickness-factor})^{(k-1)}$. 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.

`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): *FretBoard* (page 550).

3.2.53 *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): *Glissando* (page 552).

3.2.54 *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): *GraceSpacing* (page 553).

3.2.55 *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 deminished?

`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?

`strophia` (boolean)
Is this neume a strophia?

`virga` (boolean)
Is this neume a virga?

This grob interface is used in the following graphical object(s): `NoteHead` (page 596).

3.2.56 `grid-chord-name-interface`

A chord name in a chord grid.

Internal properties:

`index` (non-negative, exact integer)
For some grobs in a group, this is a number associated with the grob.

This grob interface is used in the following graphical object(s): `GridChordName` (page 553).

3.2.57 `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): `GridLine` (page 554).

3.2.58 `grid-point-interface`

A spanning point for grid lines.

This grob interface is used in the following graphical object(s): `GridPoint` (page 555).

3.2.59 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 3.1.93 [NoteCollision], page 594, object is also an abstract grob: It only moves around chords, but doesn't print anything.

Grob properties (Scheme variables) 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 staff-space units.

`minimum-Y-extent` (pair of numbers)

Minimum size of an object in Y dimension, measured in staff-space units.

`output-attributes` (association list (list of pairs))

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"))
```

produces

```
<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 has 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.

`parenthesis-id` (symbol)

When parenthesized grobs created in the same time step have this property, there is one set of parentheses for each group of grobs having the same value.

`parenthesized` (boolean)

Parenthesize this grob.

`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.

`show-horizontal-skylines` (boolean)

If true, print this grob's horizontal skylines. This is meant for debugging purposes.

`show-vertical-skylines` (boolean)

If true, print this grob's vertical skylines. This is meant for debugging purposes.

`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 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 line-thickness. The shape of the background is determined by `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.

`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 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.

`interfaces` (list)

A list of symbols indicating the interfaces supported by this object. It is initialized from the meta field.

`meta` (alist, with symbols as keys)

Provide meta information. It is an alist 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): Accidental (page 475), AccidentalCautionary (page 476), AccidentalPlacement (page 477), AccidentalSuggestion (page 478), Ambitus (page 479), AmbitusAccidental (page 481), AmbitusLine (page 482), AmbitusNoteHead (page 482), Arpeggio (page 483), BalloonText (page 485), BarLine (page 486), BarNumber (page 489), BassFigure (page 491), BassFigureAlignment (page 492), BassFigureAlignmentPositioning (page 492), BassFigureBracket (page 493), BassFigureContinuation (page 494), BassFigureLine (page 494), Beam (page 495), BendAfter (page 497), BendSpanner (page 498), BreakAlignGroup (page 500), BreakAlignment (page 501), BreathingSign (page 502), CaesuraScript (page 505), CenteredBarNumber (page 506), CenteredBarNumberLineSpanner (page 507), ChordName (page 508), ChordSquare (page 509), Clef (page 510), ClefModifier (page 513), ClusterSpanner (page 514), ClusterSpannerBeacon (page 515), CodaMark (page 515), CombineTextScript (page 517), ControlPoint (page 519), ControlPolygon (page 520), CueClef (page 521), CueEndClef (page 524), Custos (page 527), Divisio (page 528), DotColumn (page 531), Dots (page 531), DoublePercentRepeat (page 532), DoublePercentRepeatCounter (page 534), DoubleRepeatSlash (page 535), DurationLine (page 536), DynamicLineSpanner (page 538), DynamicText (page 539), DynamicTextSpanner (page 541), Episema (page 543), FingerGlideSpanner (page 544), Fingering (page 545), FingeringColumn (page 547), Flag (page 548), Footnote (page 549), FretBoard (page 550), Glissando (page 552), GraceSpacing (page 553), GridChordName (page 553), GridLine (page 554), GridPoint (page 555), Hairpin (page 555), HorizontalBracket (page 557), HorizontalBracketText (page 558), InstrumentName (page 559), InstrumentSwitch (page 560), JumpScript (page 561), KeyCancellation (page 563), KeySignature (page 566), KievanLigature (page 568), LaissezVibrerTie (page 569), LaissezVibrerTieColumn (page 570), LedgerLineSpanner (page 570), LeftEdge (page 571), LigatureBracket (page 573), LyricExtender (page 574), LyricHyphen (page 575), LyricRepeatCount (page 576), LyricSpace (page 578), LyricText (page 578), MeasureCounter (page 580), MeasureGrouping (page 582), MeasureSpanner (page 583), MelodyItem (page 584), MensuralLigature (page 584), MetronomeMark (page 585), MultiMeasureRest (page 587), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), MultiMeasureRestText (page 591), NonMusicalPaperColumn (page 593), NoteCollision (page 594), NoteColumn (page 595), NoteHead (page 596), NoteName (page 597), NoteSpacing (page 597), OttavaBracket (page 598), PaperColumn (page 599), Parentheses (page 600), PercentRepeat (page 601), PercentRepeatCounter (page 602), PhrasingSlur (page 604), PianoPedalBracket (page 605), RehearsalMark (page 607), RepeatSlash (page 608), RepeatTie (page 609), RepeatTieColumn (page 610), Rest (page 611), RestCollision (page 612), Script (page 612), ScriptColumn (page 613), ScriptRow (page 614), SectionLabel (page 614), SegnoMark (page 616), SignumRepetitionis (page 618), Slur (page 621), SostenuatoPedal (page 623), SostenuatoPedalLineSpanner (page 624), SpacingSpanner (page 625), SpanBar (page 626), SpanBarStub (page 627), StaffEllipsis (page 628), StaffGrouper (page 630), StaffHighlight (page 631), StaffSpacing (page 632), StaffSymbol (page 632), StanzaNumber (page 633), Stem (page 634), StemStub (page 636), StemTremolo (page 636), StringNumber (page 637), StrokeFinger (page 639), SustainPedal (page 640), SustainPedalLineSpanner (page 641), System (page 643), SystemStartBar (page 644), SystemStartBrace (page 645), SystemStartBracket (page 645), SystemStartSquare (page 646), TabNoteHead (page 647), TextMark (page 649), TextScript (page 651), TextSpanner (page 653), Tie (page 654), TieColumn (page 656),

TimeSignature (page 657), TrillPitchAccidental (page 659), TrillPitchGroup (page 660), TrillPitchHead (page 661), TrillPitchParentheses (page 662), TrillSpanner (page 662), TupletBracket (page 664), TupletNumber (page 665), UnaCordaPedal (page 666), UnaCordaPedalLineSpanner (page 667), VaticanaLigature (page 669), VerticalAlignment (page 669), VerticalAxisGroup (page 670), VoiceFollower (page 672), VoltaBracket (page 673), VoltaBracketSpanner (page 674), and VowelTransition (page 675).

3.2.60 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).

endpoint-alignments (pair of numbers)

A pair of numbers representing the alignments of an object's endpoints. E.g., the ends of a hairpin relative to NoteColumn grobs.

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): Hairpin (page 555).

3.2.61 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 `VerticalAxisGroups`. If any of them are alive, then we will stay alive.

`make-dead-when` (array of grobs)

An array of other `VerticalAxisGroups`. If any of them are alive, then we will turn dead.

This grob interface is used in the following graphical object(s): `VerticalAxisGroup` (page 670).

3.2.62 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): `HorizontalBracket` (page 557), `OttavaBracket` (page 598), and `VoltaBracket` (page 673).

3.2.63 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): `HorizontalBracketText` (page 558).

3.2.64 horizontal-line-spanner-interface

This interface is a subset of the Section 3.2.78 [`line-spanner-interface`], page 719, for use with line spanners that are always horizontal (such as crescendo spanners). The `details.Y` subproperty is irrelevant. Grobs having this interface can be side-positioned vertically.

This grob interface is used in the following graphical object(s): `DurationLine` (page 536), `DynamicTextSpanner` (page 541), `Episema` (page 543), `TextSpanner` (page 653), `TrillSpanner` (page 662), and `VowelTransition` (page 675).

3.2.65 inline-accidental-interface

An inlined accidental (i.e., normal accidentals, cautionary accidentals).

This grob interface is used in the following graphical object(s): `Accidental` (page 475), `AccidentalCautionary` (page 476), and `TrillPitchAccidental` (page 659).

3.2.66 instrument-specific-markup-interface

Instrument-specific markup (like fret boards or harp pedal diagrams).

User settable properties:

`fret-diagram-details` (alist, with symbols as keys)

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 `arabic`, `roman-ij-lower`, `roman-ij-upper`, `roman-lower`, `roman-upper`, `arabic` and `custom`. In the last 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 $\text{thickness} * (1 + \text{string-thickness-factor})^{(k-1)}$. 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` (alist, with symbols as keys)

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`).

`woodwind-diagram-details` (alist, with symbols as keys)

An alist of detailed grob properties for woodwind diagrams. Each alist entry consists of a (*property* . *value*) pair. The properties which can be included in woodwind-diagram-details include the following:

- `fill-angle` – Rotation angle of a partially filled key from horizontal. Default value 0.
- `text-trill-circled` – In non-graphical mode, for keys shown as text, indicate a trill by circling the text if true, or by shading the text if false. Default value `#t`.

This grob interface is used in the following graphical object(s): `TextScript` (page 651).

3.2.67 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:

	grob will show:		
	before	no	after
	break	break	break
<code>all-invisible</code>	no	no	no
<code>begin-of-line-visible</code>	no	no	yes

end-of-line-visible	yes	no	no
all-visible	yes	yes	yes
begin-of-line-invisible	yes	yes	no
end-of-line-invisible	no	yes	yes
center-invisible	yes	no	yes

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): *Accidental* (page 475), *AccidentalCautionary* (page 476), *AccidentalPlacement* (page 477), *AccidentalSuggestion* (page 478), *Ambitus* (page 479), *AmbitusAccidental* (page 481), *AmbitusLine* (page 482), *AmbitusNoteHead* (page 482), *Arpeggio* (page 483), *BarLine* (page 486), *BarNumber* (page 489), *BassFigure* (page 491), *BassFigureBracket* (page 493), *BreakAlignGroup* (page 500), *BreakAlignment* (page 501), *BreathingSign* (page 502), *CaesuraScript* (page 505), *ChordName* (page 508), *Clef* (page 510), *ClefModifier* (page 513), *ClusterSpannerBeacon* (page 515), *CodaMark* (page 515), *CombineTextScript* (page 517), *CueClef* (page 521), *CueEndClef* (page 524), *Custos* (page 527), *Divisio* (page 528), *DotColumn* (page 531), *Dots* (page 531), *DoublePercentRepeat* (page 532), *DoublePercentRepeatCounter* (page 534), *DoubleRepeatSlash* (page 535), *DynamicText* (page 539), *Fingering* (page 545), *FingeringColumn* (page 547), *Flag* (page 548), *FretBoard* (page 550), *GridLine* (page 554), *GridPoint* (page 555), *InstrumentSwitch* (page 560), *JumpScript* (page 561), *KeyCancellation* (page 563), *KeySignature* (page 566), *LaissezVibrerTie* (page 569), *LaissezVibrerTieColumn* (page 570), *LeftEdge* (page 571), *LyricRepeatCount* (page 576), *LyricText* (page 578), *MelodyItem* (page 584), *MetronomeMark* (page 585), *NonMusicalPaperColumn* (page 593), *NoteCollision* (page 594), *NoteColumn* (page 595), *NoteHead* (page 596), *NoteName* (page 597), *NoteSpacing* (page 597), *PaperColumn* (page 599), *RehearsalMark* (page 607), *RepeatSlash* (page 608), *RepeatTie* (page 609), *RepeatTieColumn* (page 610), *Rest* (page 611), *RestCollision* (page 612), *Script* (page 612), *ScriptColumn* (page 613), *ScriptRow* (page 614), *SectionLabel* (page 614), *SegnoMark* (page 616), *SignumRepetitionis* (page 618), *SostenutoPedal* (page 623), *SpanBar* (page 626), *SpanBarStub* (page 627), *StaffEllipsis* (page 628), *StaffSpacing* (page 632), *StanzaNumber* (page 633), *Stem* (page 634), *StemStub* (page 636), *StemTremolo* (page 636), *StringNumber* (page 637), *StrokeFinger* (page 639), *SustainPedal* (page 640), *TabNoteHead* (page 647), *TextMark* (page 649), *TextScript* (page 651), *TimeSignature* (page 657), *TrillPitchAccidental* (page 659), *TrillPitchGroup* (page 660),

TrillPitchHead (page 661), TrillPitchParentheses (page 662), and UnaCordaPedal (page 666).

In addition, this interface is supported conditionally by the following objects depending on their class: BalloonText (page 485), ControlPoint (page 519), ControlPolygon (page 520), Footnote (page 549), and Parentheses (page 600).

3.2.68 jump-script-interface

A jump instruction, e.g., *D.S.*.

This grob interface is used in the following graphical object(s): JumpScript (page 561).

3.2.69 key-cancellation-interface

A key cancellation.

This grob interface is used in the following graphical object(s): KeyCancellation (page 563).

3.2.70 key-signature-interface

A group of accidentals, to be printed as signature sign.

User settable properties:

`alteration-alist` (association list (list of pairs))

List of (*pitch* . *accidental*) pairs for key signature.

`alteration-glyph-name-alist` (association list (list of pairs))

An alist of key-string pairs.

`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.

`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` (association list (list of pairs))

An alist of padding pairs for key signatures (and key cancellations). Each alist entry has the form

`((left-glyph-name . right-glyph-name) . dist)`

specifying the padding *dist* between two adjacent key signature elements. If there is no entry in the alist for a given pair, the padding value given by the padding property of the KeySignature (or KeyCancellation) grob is used instead.

A special feature is the handling of adjacent naturals (to be more precise, the handling of glyph accidentals.natural): If there is no ‘natural-natural’ entry in padding-pairs explicitly overriding it, LilyPond adds some extra padding (in addition to the grob’s padding value) to avoid collisions.

`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.

Internal properties:

`c0-position` (integer)

An integer indicating the position of middle C.

This grob interface is used in the following graphical object(s): `KeyCancellation` (page 563), and `KeySignature` (page 566).

3.2.71 kievian-ligature-interface

A kievian 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): `KievianLigature` (page 568).

3.2.72 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 3.1.127 [`StaffSymbol`], page 632, 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): `LedgerLineSpanner` (page 570).

3.2.73 ledgered-interface

Objects that need ledger lines, typically note heads. See also Section 3.2.72 [`ledger-line-spanner-interface`], page 717.

User settable properties:

`no-ledgers` (boolean)

If set, don't draw ledger lines on this object.

This grob interface is used in the following graphical object(s): `AmbitusNoteHead` (page 482), `NoteHead` (page 596), and `TrillPitchHead` (page 661).

3.2.74 ligature-bracket-interface

A bracket indicating a ligature in the original edition.

User settable properties:

`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.

3.2.75 ligature-head-interface

A note head that can become part of a ligature.

This grob interface is used in the following graphical object(s): `NoteHead` (page 596).

3.2.76 ligature-interface

A ligature.

This grob interface is not used in any graphical object.

3.2.77 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:

`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 spanner line can be constructed from a whole number of squiggles.

This grob interface is used in the following graphical object(s): `ChordSquare` (page 509), `DurationLine` (page 536), `DynamicTextSpanner` (page 541), `Episema` (page 543), `Glissando` (page 552), `Hairpin` (page 555), `HorizontalBracket` (page 557), `LigatureBracket` (page 573), `MeasureSpanner` (page 583), `OttavaBracket` (page 598), `PianoPedalBracket` (page 605), `TextSpanner` (page 653), `TrillSpanner` (page 662), `TupletBracket` (page 664), `VoiceFollower` (page 672), `VoltaBracket` (page 673), and `VowelTransition` (page 675).

3.2.78 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. Not relevant for grobs having the Section 3.2.64 [horizontal-line-spanner-interface], page 712.

`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.

`end-on-note`

If set to true, when the line spanner is broken, each broken piece only extends to the furthest note, not to the end of the staff, on sides where it is broken.

`end-on-accidental`

Only meaningful in `bound-details.right`. If set to true, the line spanner stops before the accidentals if its right bound is a note column or a grob contained in a note column, and this note column has accidentals.

`start-at-dot`

Only meaningful in `bound-details.left`. If true, the line spanner starts after dots, in a fashion similar to `end-on-accidental`.

adjust-on-neighbor

If true, the `left-neighbor` or `right-neighbor` object is read, and if it exists, the line spanner starts after it or stops before it.

stencil

Line spanners may have symbols at the beginning or end, which is contained in this sub-property. For internal use.

text

This is a markup that is evaluated to yield the stencil.

stencil-align-dir-y**stencil-offset**

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` (alist, with symbols as keys)

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` (alist, with symbols as keys)

An alist of properties for determining attachments of spanners to edges.

`right-bound-info` (alist, with symbols as keys)

An alist of properties for determining attachments of spanners to edges.

`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:

`left-neighbor` (graphical (layout) object)

A grob similar to this one, on its left. For columns, the right-most column that has a spacing wish for this column.

`note-columns` (array of grobs)

An array of `NoteColumn` grobs.

right-neighbor (graphical (layout) object)
See left-neighbor.

This grob interface is used in the following graphical object(s): BendSpanner (page 498), DurationLine (page 536), DynamicTextSpanner (page 541), Episema (page 543), FingerGlideSpanner (page 544), Glissando (page 552), TextSpanner (page 653), TrillSpanner (page 662), VoiceFollower (page 672), and VowelTransition (page 675).

3.2.79 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): LyricExtender (page 574).

3.2.80 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): *LyricHyphen* (page 575), and *LyricSpace* (page 578).

3.2.81 lyric-interface

Any object that is related to lyrics.

This grob interface is used in the following graphical object(s): *LyricExtender* (page 574), *LyricHyphen* (page 575), *LyricRepeatCount* (page 576), and *VowelTransition* (page 675).

3.2.82 lyric-repeat-count-interface

A repeat count intended to appear in a line of lyrics.

This grob interface is used in the following graphical object(s): *LyricRepeatCount* (page 576).

3.2.83 lyric-space-interface

An invisible object that prevents lyric words from being spaced too closely.

This grob interface is used in the following graphical object(s): *LyricSpace* (page 578).

3.2.84 lyric-syllable-interface

A single piece of lyrics.

This grob interface is used in the following graphical object(s): *LyricText* (page 578).

3.2.85 mark-interface

A rehearsal mark, segno, or coda sign.

This grob interface is used in the following graphical object(s): *CodaMark* (page 515), *RehearsalMark* (page 607), *SegnoMark* (page 616), and *TextMark* (page 649).

3.2.86 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 following measures are numbered in increments from this initial value.

`left-number-text` (markup)

For a measure counter, this is the formatted measure count. When the measure counter extends over several measures (like with compressed multi-measure rests), it is the text on the left side of the dash.

`number-range-separator` (markup)

For a measure counter extending over several measures (like with compressed multi-measure rests), this is the separator between the two printed numbers.

`right-number-text` (markup)

When the measure counter extends over several measures (like with compressed multi-measure rests), this is the text on the right side of the dash. Usually unset.

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): `MeasureCounter` (page 580).

3.2.87 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): `MeasureGrouping` (page 582).

3.2.88 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` 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)

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.

`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)
```

`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`).

This grob interface is used in the following graphical object(s): `MeasureSpanner` (page 583).

3.2.89 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): `MelodyItem` (page 584).

3.2.90 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): `MensuralLigature` (page 584), and `NoteHead` (page 596).

3.2.91 metronome-mark-interface

A metronome mark.

This grob interface is used in the following graphical object(s): `MetronomeMark` (page 585).

3.2.92 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): `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), and `MultiMeasureRestText` (page 591).

3.2.93 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 between 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 following 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): `MultiMeasureRest` (page 587), and `PercentRepeat` (page 601).

3.2.94 multi-measure-rest-number-interface

Multi measure rest number that is printed over a rest.

This grob interface is used in the following graphical object(s): `MultiMeasureRestNumber` (page 588).

3.2.95 musical-paper-column-interface

A paper column that is musical. Paper columns of this variety group musical items, such as note heads, stems, dots, accidentals, ...

User settable properties:

`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.

Internal properties:

`grace-spacing` (graphical (layout) object)

A run of grace notes.

This grob interface is used in the following graphical object(s): `PaperColumn` (page 599).

3.2.96 non-musical-paper-column-interface

A paper column that is non-musical. Paper columns of this variety group breakable items such as clefs, bar lines, time signatures, key signatures, breathing signs, . . .

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.

`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` (alist, with symbols as keys)

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.

Internal properties:

`break-alignment` (graphical (layout) object)

The `BreakAlignment` (page 501), in a `NonMusicalPaperColumn` (page 593).

This grob interface is used in the following graphical object(s): `NonMusicalPaperColumn` (page 593).

3.2.97 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 3.2.98 [note-column-interface], page 728: these are `force-hshift` and `horizontal-shift`.

User settable properties:

`fa-merge-direction` (direction)

If two ‘fa’ shape note heads get merged that are both listed in the `fa-styles` property but have different stem directions, enforce this note head direction for display.

`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:

`fa-styles` (symbol list)

List of note head styles that identify ‘fa’ shape note heads.

`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): `NoteCollision` (page 594).

3.2.98 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.

`main-extent` (pair of numbers)

The horizontal extent of a NoteColumn grob without taking suspended NoteHead grobs into account (i.e., NoteHeads forced into the unnatural direction of the Stem because of a chromatic clash).

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): NoteColumn (page 595).

3.2.99 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): `AmbitusNoteHead` (page 482), `NoteHead` (page 596), and `TabNoteHead` (page 647).

3.2.100 note-name-interface

Note names.

This grob interface is used in the following graphical object(s): `NoteName` (page 597).

3.2.101 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): `NoteSpacing` (page 597).

3.2.102 number-interface

Numbers.

User settable properties:

`number-type` (symbol)

Numbering style. Choices include `arabic`, `roman-ij-lower`, `roman-ij-upper`, `roman-lower`, and `roman-upper`.

This grob interface is used in the following graphical object(s): `StringNumber` (page 637).

3.2.103 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): `OttavaBracket` (page 598).

3.2.104 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): `BassFigureLine` (page 494), `System` (page 643), and `VerticalAxisGroup` (page 670).

3.2.105 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 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-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): `AccidentalSuggestion` (page 478), `BarNumber` (page 489), `BassFigureAlignmentPositioning` (page 492), `BendSpanner` (page 498), `BreathingSign` (page 502), `CaesuraScript` (page 505), `CenteredBarNumberLineSpanner` (page 507), `ChordName` (page 508), `ClefModifier` (page 513), `CodaMark` (page 515), `CombineTextScript` (page 517), `Divisio` (page 528), `DoublePercentRepeatCounter` (page 534), `DoubleRepeatSlash` (page 535), `DynamicLineSpanner` (page 538), `DynamicText` (page 539), `Fingering` (page 545), `FretBoard` (page 550), `Hairpin` (page 555), `HorizontalBracket` (page 557), `HorizontalBracketText` (page 558), `InstrumentSwitch` (page 560), `JumpScript` (page 561), `MeasureCounter` (page 580), `MeasureGrouping` (page 582), `MeasureSpanner` (page 583), `MetronomeMark` (page 585), `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), `MultiMeasureRestText` (page 591), `OttavaBracket` (page 598), `PercentRepeatCounter` (page 602), `PhrasingSlur` (page 604), `RehearsalMark` (page 607), `Script` (page 612), `SectionLabel` (page 614), `SegnoMark` (page 616), `Slur` (page 621), `SostenutoPedalLineSpanner` (page 624), `StringNumber` (page 637), `StrokeFinger` (page 639), `SustainPedalLineSpanner` (page 641), `TextMark` (page 649), `TextScript` (page 651), `TextSpanner` (page 653), `TrillSpanner` (page 662), `TupletBracket` (page 664), `TupletNumber` (page 665), `UnaCordaPedalLineSpanner` (page 667), and `VoltaBracketSpanner` (page 674).

3.2.106 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.

The paper-column-interface implies the item-interface (page 714).

User settable properties:

`labels` (list)

List of labels (symbols) placed on a column.

rhythmic-location (rhythmic location)

Where (bar number, measure position) in the score.

used (boolean)

If set, this spacing column is kept in the spacing problem.

when (moment)

Global time step associated with this column.

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.

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): `NonMusicalPaperColumn` (page 593), and `PaperColumn` (page 599).

3.2.107 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): `Parentheses` (page 600), and `TrillPitchParentheses` (page 662).

3.2.108 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 *Staff.StaffSymbol.thickness*).

This grob interface is used in the following graphical object(s): *DoublePercentRepeat* (page 532), *DoubleRepeatSlash* (page 535), *PercentRepeat* (page 601), and *RepeatSlash* (page 608).

3.2.109 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): *PianoPedalBracket* (page 605).

3.2.110 piano-pedal-interface

A piano pedal sign.

This grob interface is used in the following graphical object(s): *PianoPedalBracket* (page 605), *SostenutoPedalLineSpanner* (page 624), *SustainPedal* (page 640), *SustainPedalLineSpanner* (page 641), and *UnaCordaPedalLineSpanner* (page 667).

3.2.111 piano-pedal-script-interface

A piano pedal sign, fixed size.

This grob interface is used in the following graphical object(s): *SostenutoPedal* (page 623), *SustainPedal* (page 640), and *UnaCordaPedal* (page 666).

3.2.112 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): *TrillPitchHead* (page 661), and *TrillPitchParentheses* (page 662).

3.2.113 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): BarLine (page 486), Clef (page 510), CueClef (page 521), CueEndClef (page 524), KeyCancellation (page 563), KeySignature (page 566), SignumRepetitionis (page 618), SpanBarStub (page 627), and TimeSignature (page 657).

3.2.114 rehearsal-mark-interface

A rehearsal mark.

This grob interface is used in the following graphical object(s): RehearsalMark (page 607).

3.2.115 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): RestCollision (page 612).

3.2.116 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): MultiMeasureRest (page 587), and Rest (page 611).

3.2.117 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): BassFigure (page 491), ChordName (page 508), ClusterSpannerBeacon (page 515), DoubleRepeatSlash (page 535), FretBoard (page 550), LyricText (page 578), NoteHead (page 596), RepeatSlash (page 608), Rest (page 611), and TabNoteHead (page 647).

3.2.118 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): NoteHead (page 596), Rest (page 611), TabNoteHead (page 647), and TrillPitchHead (page 661).

3.2.119 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): ScriptColumn (page 613), and ScriptRow (page 614).

3.2.120 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): `AccidentalSuggestion` (page 478), `CaesuraScript` (page 505), `DynamicText` (page 539), `MultiMeasureRestScript` (page 590), and `Script` (page 612).

3.2.121 section-label-interface

A section label, e.g., “Coda”.

This grob interface is used in the following graphical object(s): `SectionLabel` (page 614).

3.2.122 segno-mark-interface

A segno.

This grob interface is used in the following graphical object(s): SegnoMark (page 616).

3.2.123 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.

`self-alignment-Y` (number)

Like self-alignment-X but for the Y axis.

`X-align-on-main-noteheads` (boolean)

If true, this grob will ignore suspended noteheads when aligning itself on NoteColumn.

This grob interface is used in the following graphical object(s): AccidentalSuggestion (page 478), BarNumber (page 489), CaesuraScript (page 505), ClefModifier (page 513), CodaMark (page 515), CombineTextScript (page 517), DoublePercentRepeatCounter (page 534), DynamicText (page 539), Fingering (page 545), GridLine (page 554), Hairpin (page 555), HorizontalBracketText (page 558), InstrumentName (page 559), InstrumentSwitch (page 560), JumpScript (page 561), LyricRepeatCount (page 576), LyricText (page 578), MeasureCounter (page 580), MeasureSpanner (page 583), MetronomeMark (page 585), MultiMeasureRestNumber (page 588), MultiMeasureRestScript (page 590), MultiMeasureRestText (page 591), PercentRepeatCounter (page 602), RehearsalMark (page 607), Script (page 612), SectionLabel (page 614), SegnoMark (page 616), SostenutoPedal (page 623), StemTremolo (page 636), StringNumber (page 637), StrokeFinger (page 639), SustainPedal (page 640), TextMark (page 649), TextScript (page 651), and UnaCordaPedal (page 666).

3.2.124 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 (*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): `LaissezVibrerTieColumn` (page 570), and `RepeatTieColumn` (page 610).

3.2.125 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` (alist, with symbols as keys)

Alist 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:

annotation (string)

Annotate a grob for debug purposes.

note-head (graphical (layout) object)

A single note head.

This grob interface is used in the following graphical object(s): *LaissezVibrerTie* (page 569), and *RepeatTie* (page 609).

3.2.126 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): *NonMusicalPaperColumn* (page 593), *NoteColumn* (page 595), and *PaperColumn* (page 599).

3.2.127 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` (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` (boolean)

Should skylines be used for side positioning?

Internal properties:

`quantize-position` (boolean)

If set, a vertical alignment is aligned to be within staff spaces.

`side-support-elements` (array of grobs)

The side support, an array of grobs.

This grob interface is used in the following graphical object(s): `AccidentalSuggestion` (page 478), `Arpeggio` (page 483), `BarNumber` (page 489), `BassFigureAlignmentPositioning` (page 492), `CaesuraScript` (page 505), `CenteredBarNumberLineSpanner` (page 507), `ClefModifier` (page 513), `CodaMark` (page 515), `CombineTextScript` (page 517), `DoublePercentRepeatCounter` (page 534), `DynamicLineSpanner` (page 538), `Episema` (page 543), `Fingering` (page 545), `HorizontalBracket` (page 557), `HorizontalBracketText` (page 558), `InstrumentName` (page 559), `InstrumentSwitch` (page 560), `JumpScript` (page 561), `MeasureCounter` (page 580), `MeasureGrouping` (page 582), `MeasureSpanner` (page 583), `MetronomeMark` (page 585), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), `MultiMeasureRestText` (page 591), `OttavaBracket` (page 598), `PercentRepeatCounter` (page 602), `RehearsalMark` (page 607), `Script` (page 612), `SectionLabel` (page 614), `SegnoMark` (page 616), `SostenutoPedalLineSpanner` (page 624), `StanzaNumber` (page 633), `StringNumber` (page 637), `StrokeFinger` (page 639), `SustainPedalLineSpanner` (page 641), `SystemStartBar` (page 644), `SystemStartBrace` (page 645), `SystemStartBracket` (page 645), `SystemStartSquare` (page 646), `TextMark` (page 649), `TextScript` (page 651), `TextSpanner` (page 653),

TrillPitchAccidental (page 659), TrillPitchGroup (page 660), TrillSpanner (page 662), UnaCordaPedalLineSpanner (page 667), VoltaBracket (page 673), and VoltaBracketSpanner (page 674).

3.2.128 signum-repetitionis-interface

An ancient repeat sign. It is printed with the same infrastructure as bar lines, but it is not a bar line.

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): `SignumRepetitionis` (page 618).

3.2.129 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 region-size staff spaces. The following properties may be set in the 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:

`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` (alist, with symbols as keys)

Alist 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 (*start . end*), where *start* and *end* are vertical positions 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 *Staff.StaffSymbol.thickness*).

Internal properties:

- annotation** (string)
Annotate a grob for debug purposes.
- 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 *NoteColumn* grobs.

This grob interface is used in the following graphical object(s): *PhrasingSlur* (page 604), and *Slur* (page 621).

3.2.130 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)
(*obj . (dist . strength)*) pairs.
- left-neighbor** (graphical (layout) object)
A grob similar to this one, on its left. For columns, the right-most column that has a spacing wish for this column.
- minimum-distances** (list)
A list of rods that have the format (*obj . dist*).

right-neighbor (graphical (layout) object)

See 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): `NonMusicalPaperColumn` (page 593), and `PaperColumn` (page 599).

3.2.131 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): `NoteSpacing` (page 597), and `StaffSpacing` (page 632).

3.2.132 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): `GraceSpacing` (page 553), and `SpacingSpanner` (page 625).

3.2.133 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): `SpacingSpanner` (page 625).

3.2.134 `span-bar-interface`

A bar line that is spanned between other bar lines. 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): `SpanBar` (page 626).

3.2.135 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): `BassFigureAlignment` (page 492), `BassFigureAlignmentPositioning` (page 492), `BassFigureContinuation` (page 494), `BassFigureLine` (page 494), `Beam` (page 495), `BendAfter` (page 497), `BendSpanner` (page 498), `CenteredBarNumber` (page 506), `CenteredBarNumberLineSpanner` (page 507), `ChordSquare` (page 509), `ClusterSpanner` (page 514), `DurationLine` (page 536), `DynamicLineSpanner` (page 538), `DynamicTextSpanner` (page 541), `Episema` (page 543), `FingerGlideSpanner` (page 544), `Glissando` (page 552), `GraceSpacing` (page 553), `GridChordName` (page 553), `Hairpin` (page 555), `HorizontalBracket` (page 557), `HorizontalBracketText` (page 558), `InstrumentName` (page 559), `KievanLigature` (page 568), `LedgerLineSpanner` (page 570), `LigatureBracket` (page 573), `LyricExtender` (page 574), `LyricHyphen` (page 575), `LyricSpace` (page 578), `MeasureCounter` (page 580), `MeasureGrouping` (page 582), `MeasureSpanner` (page 583), `MensuralLigature` (page 584), `MultiMeasureRest` (page 587), `MultiMeasureRestNumber` (page 588), `MultiMeasureRestScript` (page 590), `MultiMeasureRestText` (page 591), `OttavaBracket` (page 598), `PercentRepeat` (page 601), `PercentRepeatCounter` (page 602), `PhrasingSlur` (page 604), `PianoPedalBracket` (page 605), `Slur` (page 621), `SostenutoPedalLineSpanner` (page 624), `SpacingSpanner` (page 625), `StaffGrouper` (page 630), `StaffHighlight` (page 631), `StaffSymbol` (page 632), `SustainPedalLineSpanner` (page 641), `System` (page 643), `SystemStartBar` (page 644), `SystemStartBrace` (page 645), `SystemStartBracket` (page 645), `SystemStartSquare` (page 646), `TextSpanner` (page 653), `Tie` (page 654), `TieColumn` (page 656), `TrillSpanner` (page 662), `TupletBracket` (page 664), `TupletNumber` (page 665), `UnaCordaPedalLineSpanner` (page 667), `VaticanaLigature` (page 669), `VerticalAlignment` (page 669), `VerticalAxisGroup` (page 670), `VoiceFollower` (page 672),

VoltaBracket (page 673), VoltaBracketSpanner (page 674), and VowelTransition (page 675).

In addition, this interface is supported conditionally by the following objects depending on their class: BalloonText (page 485), ControlPoint (page 519), ControlPolygon (page 520), Footnote (page 549), and Parentheses (page 600).

3.2.136 staff-grouper-interface

A grob that collects staves together.

User settable properties:

`staff-staff-spacing` (alist, with symbols as keys)

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` (alist, with symbols as keys)

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): `StaffGrouper` (page 630).

3.2.137 staff-highlight-interface

A colored span to highlight a music passage.

User settable properties:

`bound-prefatory-paddings` (pair of numbers)

For a highlight, the amount of padding to insert at a bound from a prefatory item that is not a bar line.

`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:

`columns` (array of grobs)

An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

`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): `StaffHighlight` (page 631).

3.2.138 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): `StaffSpacing` (page 632).

3.2.139 staff-symbol-interface

This spanner draws the lines of a staff. A staff symbol defines a vertical unit, the *staff space*. Quantities that go by a half staff space are called *positions*. The center (i.e., middle line or space) is position 0. The length of the symbol may be set by hand through the `width` property.

User settable properties:

`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*.

`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.

`line-count` (integer)

The number of staff lines.

`line-positions` (list)

Vertical positions of staff lines.

`staff-space` (dimension, in staff space)

Amount of space between staff lines, expressed in global staff-space.

`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`).

`widened-extent` (pair of numbers)

The vertical extent that a bar line on a certain staff symbol should have. If the staff symbol is small (e.g., has just one line, as in a `RhythmicStaff`, this is wider than the staff symbol's Y extent.

`width` (dimension, in staff space)

The width of a grob measured in staff space.

This grob interface is used in the following graphical object(s): `StaffSymbol` (page 632).

3.2.140 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): `AmbitusNoteHead` (page 482), `Arpeggio` (page 483), `Beam` (page 495), `Clef` (page 510), `CueClef` (page 521), `CueEndClef` (page 524), `Custos` (page 527), `Dots` (page 531), `KeyCancellation` (page 563), `KeySignature` (page 566), `MultiMeasureRest` (page 587), `NoteHead` (page 596), `Rest` (page 611), `TabNoteHead` (page 647), and `TrillPitchHead` (page 661).

3.2.141 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): `StanzaNumber` (page 633).

3.2.142 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` (alist, with symbols as keys)

Alist 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): Stem (page 634).

3.2.143 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): StemTremolo (page 636).

3.2.144 sticky-grob-interface

A grob that is attached to another grob. Grobs type having this interface can be either items or spanners, depending on the class of their host. Sticky spanners implicitly take their bounds from the host.

Internal properties:

- sticky-host (graphical (layout) object)
The grob that a sticky grob attaches to.

This grob interface is used in the following graphical object(s): BalloonText (page 485), ControlPoint (page 519), ControlPolygon (page 520), Footnote (page 549), and Parentheses (page 600).

3.2.145 string-number-interface

A string number instruction.

This grob interface is used in the following graphical object(s): StringNumber (page 637).

3.2.146 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): StrokeFinger (page 639).

3.2.147 system-interface

This is the top-level object: Each object in a score ultimately has a System object as its X and Y parent.

The system-interface implies the spanner-interface (page 748).

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): System (page 643).

3.2.148 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): `SystemStartBar` (page 644), `SystemStartBrace` (page 645), `SystemStartBracket` (page 645), and `SystemStartSquare` (page 646).

3.2.149 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): `InstrumentName` (page 559).

3.2.150 tab-note-head-interface

A note head in tablature.

User settable properties:

details (alist, with symbols as keys)

Alist 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): TabNoteHead (page 647).

3.2.151 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 (association list (list of pairs))

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): BalloonText (page 485), BarNumber (page 489), BassFigure (page 491), BendSpanner (page 498), BreathingSign (page 502), CenteredBarNumber (page 506), ChordName (page 508), ClefModifier (page 513), CodaMark (page 515), CombineTextScript (page 517), ControlPoint (page 519), ControlPolygon (page 520), Divisio (page 528), DoublePercentRepeatCounter (page 534), DynamicText (page 539), DynamicTextSpanner (page 541), Fingering (page 545), Footnote (page 549), GridChordName (page 553), HorizontalBracketText (page 558), InstrumentName (page 559), InstrumentSwitch (page 560), JumpScript (page 561), LyricRepeatCount (page 576), LyricText (page 578), MeasureCounter (page 580), MeasureSpanner (page 583), MetronomeMark (page 585), MultiMeasureRestNumber (page 588), MultiMeasureRestText (page 591), NoteName (page 597), OttavaBracket (page 598), PercentRepeatCounter

(page 602), RehearsalMark (page 607), SectionLabel (page 614), SegnoMark (page 616), SostenutoPedal (page 623), StaffEllipsis (page 628), StanzaNumber (page 633), StringNumber (page 637), StrokeFinger (page 639), SustainPedal (page 640), TabNoteHead (page 647), TextMark (page 649), TextScript (page 651), TupletNumber (page 665), UnaCordaPedal (page 666), and VoltaBracket (page 673).

3.2.152 text-mark-interface

A textual mark.

This grob interface is used in the following graphical object(s): TextMark (page 649).

3.2.153 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): BendSpanner (page 498), CombineTextScript (page 517), Fingering (page 545), StringNumber (page 637), StrokeFinger (page 639), and TextScript (page 651).

3.2.154 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): TieColumn (page 656).

3.2.155 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:

`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` (alist, with symbols as keys)

Alist 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`).

Internal properties:

`annotation` (string)

Annotate a grob for debug purposes.

This grob interface is used in the following graphical object(s): `LaissezVibrerTie` (page 569), `RepeatTie` (page 609), and `Tie` (page 654).

3.2.156 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 value ‘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): `TimeSignature` (page 657).

3.2.157 trill-pitch-accidental-interface

An accidental for trill pitch.

This grob interface is used in the following graphical object(s): `TrillPitchAccidental` (page 659).

3.2.158 trill-spanner-interface

A trill spanner.

This grob interface is used in the following graphical object(s): `TrillSpanner` (page 662).

3.2.159 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 (*start* . *end*), where *start* and *end* are vertical positions 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.

`visible-over-note-heads` (boolean)

This prints a tuplet bracket when the bracket is set to be over the note heads. This option can be combined with the default tuplet bracket visibility style and with `#'if-no-beam`.

`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): *LigatureBracket* (page 573), and *TupletBracket* (page 664).

3.2.160 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): `TupletNumber` (page 665).

3.2.161 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): `Beam` (page 495), `DurationLine` (page 536), and `Glissando` (page 552).

3.2.162 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): `NoteHead` (page 596), and `VaticanaLigature` (page 669).

3.2.163 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): `VoltaBracket` (page 673).

3.2.164 volta-interface

A volta repeat.

This grob interface is used in the following graphical object(s): `VoltaBracket` (page 673), and `VoltaBracketSpanner` (page 674).

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` (association list (list of pairs))

List of (*pitch* . *accidental*) pairs for key signature.

`alteration-glyph-name-alist` (association list (list of pairs))

An alist of key-string pairs.

`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.

bend-me (boolean)

Decide whether this grob is bent.

between-cols (pair)

Where to attach a loose column to.

bound-details (alist, with symbols as keys)

An alist of properties for determining attachments of spanners to edges.

bound-padding (number)

The amount of padding to insert around spanner bounds.

bound-prefatory-paddings (pair of numbers)

For a highlight, the amount of padding to insert at a bound from a prefatory item that is not a bar line.

`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, `#(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 `chord-dots-limit` staff-positions.

`circled-tip` (boolean)

Put a circle at start/end of hairpins (al/del niente).

`clef-alignments` (alist, with symbols as keys)

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 starting 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 (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.

`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 (alist, with symbols as keys)

Alist 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*) entries 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.

eccentricity (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*).

endpoint-alignments (pair of numbers)

A pair of numbers representing the alignments of an object's endpoints. E.g., the ends of a hairpin relative to NoteColumn grobs.

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)`.

`extroversion` (number)

For polygons, how the thickness of the line is spread on each side of the exact polygon with ideal zero thickness. If this is 0, the middle of line is on the polygon. If 1, the line sticks out of the polygon. If -1, the outer side of the line is exactly on the polygon. Other numeric values are interpolated.

`fa-merge-direction` (direction)

If two 'fa' shape note heads get merged that are both listed in the `fa-styles` property but have different stem directions, enforce this note head direction for display.

`filled` (boolean)

Whether an object is filled with ink.

`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 (alist, with symbols as keys)

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 arabic, roman-ij-lower, roman-ij-upper, roman-lower, roman-upper, arabic and custom. In the last 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 $\text{thickness} * (1 + \text{string-thickness-factor})^{(k-1)}$. 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.

`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-left` (string)

The glyph value to use at the end of the line when the line is broken. `#f` indicates that no glyph should be visible; otherwise the value must be a string.

`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-right` (string)

The glyph value to use at the beginning of the line when the line is broken. `#f` indicates that no glyph should be visible; otherwise the value must be a string.

`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` (alist, with symbols as keys)

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` (alist, with symbols as keys)

An alist of properties for determining attachments of spanners to edges.

`left-number-text` (markup)

For a measure counter, this is the formatted measure count. When the measure counter extends over several measures (like with compressed multi-measure rests), it is the text on the left side of the dash.

`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` (alist, with symbols as keys)

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*.

`main-extent` (pair of numbers)

The horizontal extent of a `NoteColumn` grob without taking suspended `NoteHead` grobs into account (i.e., `NoteHeads` forced into the unnatural direction of the Stem because of a chromatic clash).

`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-division` (number list)

A list representing what fraction of the measure length each chord name takes in a chord square. The list is made of exact numbers between 0 and 1, which should add up to 1. Example: a measure `c2 g4 g4` results in `'(1/2 1/4 1/4)`.

`measure-division-chord-placement-alist` (association list (list of pairs))

An alist mapping measure divisions (see the `measure-division` property) to lists of coordinates (number pairs) applied to the chord names of a chord square. Coordinates are normalized between -1 and 1 within the square.

`measure-division-lines-alist` (association list (list of pairs))

An alist mapping measure divisions (see the `measure-division` property) to lists of lines to draw in the square, given as 4-element lists: `(x-start y-start x-end y-end)`.

`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-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` (alist, with symbols as keys)

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` (alist, with symbols as keys)

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` (alist, with symbols as keys)

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-range-separator (markup)

For a measure counter extending over several measures (like with compressed multi-measure rests), this is the separator between the two printed numbers.

number-type (symbol)

Numbering style. Choices include `arabic`, `roman-ij-lower`, `roman-ij-upper`, `roman-lower`, and `roman-upper`.

output-attributes (association list (list of pairs))

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"))
```

produces

```
<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 has no effect.

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 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 (association list (list of pairs))

An alist of padding pairs for key signatures (and key cancellations). Each alist entry has the form

```
((left-glyph-name . right-glyph-name) . dist)
```

specifying the padding *dist* between two adjacent key signature elements. If there is no entry in the alist for a given pair, the padding value given by the `padding` property of the `KeySignature` (or `KeyCancellation`) grob is used instead.

A special feature is the handling of adjacent naturals (to be more precise, the handling of glyph `accidentals.natural`): If there is no ‘natural-natural’ entry in `padding-pairs` explicitly overriding it, LilyPond adds some extra padding (in addition to the grob’s padding value) to avoid collisions.

`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`’.

`parenthesis-id` (symbol)

When parenthesized grobs created in the same time step have this property, there is one set of parentheses for each group of grobs having the same value.

`parenthesized` (boolean)

Parenthesize this grob.

`positions` (pair of numbers)

Pair of staff coordinates (`start . end`), where `start` and `end` are vertical positions 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 (association list (list of pairs))

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 (alist, with symbols as keys)

An alist of properties for determining attachments of spanners to edges.

right-number-text (markup)

When the measure counter extends over several measures (like with compressed multi-measure rests), this is the text on the right side of the dash. Usually unset.

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.

show-control-points (boolean)

For grobs printing Bézier curves, setting this property to true causes the control points and control polygon to be drawn on the page for ease of tweaking.

show-horizontal-skylines (boolean)

If true, print this grob’s horizontal skylines. This is meant for debugging purposes.

show-vertical-skylines (boolean)

If true, print this grob’s vertical skylines. This is meant for debugging purposes.

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.

`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` (alist, with symbols as keys)

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` (alist, with symbols as keys)

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` (alist, with symbols as keys)

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.

`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-alignment-X` (number)

How to align an annotation horizontally.

`text-alignment-Y` (number)

How to align an annotation vertically.

`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 `Staff.StaffSymbol.thickness`).

`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.

`to-barline` (boolean)

If true, the spanner will stop at the bar line just before it would otherwise stop.

`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.

`transparent` (boolean)

This makes the grob invisible.

tuplet-slur (boolean)

Draw a slur instead of a bracket for tuplets.

uniform-stretching (boolean)

If set, items stretch proportionally to their natural separation based on durations. This looks better in complex polyphonic patterns.

usable-duration-logs (list)

List of duration-logs that can be used in typesetting the grob.

use-skylines (boolean)

Should skylines be used for side positioning?

used (boolean)

If set, this spacing column is kept in the spacing problem.

vertical-skylines (pair of skylines)

Two skylines, one above and one below this grob.

visible-over-note-heads (boolean)

This prints a tuplet bracket when the bracket is set to be over the note heads. This option can be combined with the default tuplet bracket visibility style and with #'if-no-beam.

voiced-position (number)

The staff-position of a voiced Rest, negative if the rest has direction DOWN.

when (moment)

Global time step associated with this column.

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 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 line-thickness. The shape of the background is determined by 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.

widened-extent (pair of numbers)

The vertical extent that a bar line on a certain staff symbol should have. If the staff symbol is small (e.g., has just one line, as in a RhythmicStaff, this is wider than the staff symbol's Y extent.

width (dimension, in staff space)

The width of a grob measured in staff space.

woodwind-diagram-details (alist, with symbols as keys)

An alist of detailed grob properties for woodwind diagrams. Each alist entry consists of a (*property* . *value*) pair. The properties which can be included in woodwind-diagram-details include the following:

- fill-angle – Rotation angle of a partially filled key from horizontal. Default value 0.
- text-trill-circled – In non-graphical mode, for keys shown as text, indicate a trill by circling the text if true, or by shading the text if false. Default value #t.

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-attachment` (number)

Horizontal attachment of a line on a frame, typically between -1 (left) and 1 (right).

`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-attachment` (number)

Vertical attachment of a line on a frame, typically between -1 (down) and 1 (up).

`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 spanner 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` (association list (list of pairs))

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.

- `annotation` (string)
Annotate a grob for debug purposes.
- `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.
- `bezier` (graphical (layout) object)
A pointer to a Bézier curve, for use by control points and polygons.
- `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.
- `break-alignment` (graphical (layout) object)
The BreakAlignment (page 501), in a NonMusicalPaperColumn (page 593).
- `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?
- `chord-names` (array of grobs)
Array of chord names.
- `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 measured 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.

`deminutum` (boolean)

Is this neume deminished?

`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.

`dot-stencil` (stencil)

The stencil for an individual dot, as opposed to a group of several dots.

`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.

`fa-styles` (symbol list)

List of note head styles that identify 'fa' shape note heads.

`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.

`french-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?

`index` (non-negative, exact integer)

For some grobs in a group, this is a number associated with the grob.

`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)

A grob similar to this one, on its left. For columns, 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` (alist, with symbols as keys)

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` (association list (list of pairs))

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 determine 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.

sticky-host (graphical (layout) object)

The grob that a sticky grob attaches to.

strophia (boolean)

Is this neume a strophia?

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

- `add-bar-glyph-print-procedure` *a b* [Function]
Specify the single glyph *glyph* that calls print procedure *proc*. The procedure *proc* has to be defined in the form `(make-...-bar-line grob extent)` even if the *extent* is not used within the routine.
- `ly:add-context-mod` *contextmods modification* [Function]
Adds the given context *modification* to the list *contextmods* of context modifications.
- `add-grace-property` *a b c d* [Function]
Set *sym=val* for *grob* in *context-name*.
- `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.
- `add-music-fonts` *a b c d e f* [Function]
Set up music fonts.
Arguments:
- *node* is the font tree to modify.
 - *family* is the family name of the music font.
 - *name* is the basename for the music font. *name*-<designsize>.otf should be the music font.
 - *brace* is the basename for the brace font. *brace*-brace.otf should have piano braces.
 - *design-size-alist* is a list of `(rounded . designsize)`. *rounded* is a suffix for font file-names, while *designsize* should be the actual design size. The latter is used for text fonts loaded through pango/fontconfig.
 - *factor* is a size factor relative to the default size that is being used. This is used to select the proper design size for the text fonts.
- `add-new-clef` *a b c d e* [Function]
Append the entries for a clef symbol to supported clefs and `c0-pitch-alist`.
- `ly:add-option` *sym val internal description* [Function]
Add a program option *sym*. *val* is the default value and *description* is a string description.
- `add-simple-time-signature-style` *a b* [Function]
Specify the procedure *proc* returning markup for a time signature style *style*. The procedure is called with one argument, the pair `(numerator . denominator)`.
- `add-stroke-glyph` *a b c d e* [Function]
Load and add a stroke (represented by a glyph in the font) to the given flag stencil.
- `add-stroke-straight` *a b c d e f g more ...* [Function]
Add the stroke for acciaccatura to the given flag stencil. The stroke starts for up-flags at ‘upper-end-of-flag + (0,length/2)’ and ends at ‘(0, vertical-center-of-flag-end) - (flag-x-width/2, flag-x-width + flag-thickness)’. Here ‘length’ is the whole length, while ‘flag-x-width’ is just the x extent and thus depends on the angle! Other combinations don’t look as good. For down-stems the y coordinates are simply mirrored.

- `alist->hash-table a` [Function]
Convert alist *lst* to a table.
- Warning:** The resulting hash table is hashed by identity. This actually corresponds to the `alist->hashq-table` function of Guile's (`ice-9 hash-table`) module, **not** `alist->hash-table`.
- `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-output-backend-commands` [Function]
Return the list of extra output backend commands that are used internally in file `lily/stencil-interpret.cc`.
- `ly:all-stencil-commands` [Function]
Return the list of stencil commands that can be defined in the output modules (in files `output-*.scm`).
- `ly:all-stencil-expressions` [Function]
Return all symbols recognized as stencil expressions.
- `allow-volta-hook a` [Function]
Allow the volta bracket hook being drawn over bar line *bar-glyph*.
- `alterations-in-key a` [Function]
Count number of sharps minus number of flats.
- `ly:angle x y` [Function]
Calculate 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.
- `angle-0-2pi a` [Function]
Take *angle* (in radians) and map it between 0 and 2pi.
- `angle-0-360 a` [Function]
Take *angle* (in degrees) and map it between 0 and 360 degrees.
- `arrow-stencil a b c d e` [Function]
Return a right-pointing, filled arrow-head, where *x* determines the basic horizontal position and *y* determines the basic vertical position. Both values are adjusted using *staff-space*, which is `StaffSymbol`'s staff space. *thick* is the used line thickness.
- `arrow-stencil-maker a b` [Function]
Return a function drawing a line from current point to destination, with optional arrows of max-size on start and end controlled by *start?* and *end?*.
- `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.
- `assoc-get - - [- [-]]` [Function]
- LilyPond procedure: `ly:assoc-get (SCM key, SCM alist, SCM default-value, SCM strict-checking)`
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.

- `at-bar-line-substitute-caesura-type a` [Function]
At a bar line, create the caesura using *substitute-type* rather than the value of *caesuraType*.
- `ly:axis-group-interface::add-element grob grob-element` [Function]
Add *grob-element* to the axis group *grob*. In particular, *grob* becomes parent to *grob-element* on all axes supported by *grob*, unless the parents are already set.
- `ly:bar-line::calc-anchor a` [Function]
Calculate the anchor position of a bar line. The anchor is used for the correct placement of bar numbers, etc.
- `bar-line::calc-break-visibility a` [Function]
Calculate the visibility of a bar line at line breaks.
- `bar-line::calc-glyph-name a` [Function]
Return the name of the bar line glyph printed by *grob* for the actual break direction.
- `bar-line::calc-glyph-name-for-direction a b` [Function]
Find the glyph name for a bar line. *glyphs* is the list of bar-line types to consider in order. Each must have been defined with *define-bar-line*. *dir* is the break direction to consider: LEFT = end of line, CENTER = middle of line, RIGHT = start of line.
- `bar-line::compound-bar-line a b c` [Function]
Build the bar line stencil.
- `bar-line::draw-filled-box a b c d e` [Function]
Return a straight bar line created by *ly:round-filled-box* looking at *x-ext*, *y-ext*, *thickness*. The blot is calculated by *bar-line::calc-blot*, which needs *extent* and *grob*. *y-ext* is not necessarily of same value as *extent*.
- `ly:bar-line::print a` [Function]
The print routine for bar lines.
- `bar-line::widen-bar-extent-on-span a b` [Function]
Widen the bar line *extent* towards span bars adjacent to *grob grob*.
- `base-length a b` [Function]
Get *baseMoment* rational value for *time-signature* from *time-signature-settings*.
- `ly:basic-progress str rest` [Function]
A Scheme callable function to issue a basic progress message *str*. The message is formatted with *format*; *rest* holds the formatting arguments (if any).
- `beam-exceptions a b` [Function]
Get *beamExceptions* value for *time-signature* from *time-signature-settings*.
- `beat-structure a b c` [Function]
Get *beatStructure* value in *base-length* units for *time-signature* from *time-signature-settings*.
- `bend::arrow-head-stencil a b c d e` [Function]
Return an arrow head stencil, calculated from the given dimensions *height* and *width*, and translated to *x-y-coords*, the end of the bend-spanners (curved) line.

`bend::calc-bend-x-begin a b c d` [Function]

Calculate the starting values in x direction of the bend. After a line break, the values from the right bound are taken minus 1.5 staff spaces. For bends-down or if grob property 'style equals to 'pre-bend, 'hold or 'pre-bend-hold, interval-center is applied the topmost note head of the starting note heads. In any other case the right edge of the starting note head is used. The value of `BendSpanner.details.horizontal-left-padding` is added, which may be changed by an appropriate override. Returns a list of the same length as the amount of bend-starting note heads.

`bend::calc-bend-x-end a b c` [Function]

Calculate the ending x coordinate of *bend-spanner*. At the line end, take the items of `BreakAlignGroup` into account and a little bit of padding. Ends an unbroken spanner or the last of a broken one in the middle of the topmost note head of its bounding note column.

`bend::target-cautionary a` [Function]

Set 'display-cautionary of all relevant note heads of spanners right bound to true. As a result they appear parenthesized. This procedure is the default value of 'before-line-breaking.

`bend::text-string a` [Function]

Take a spanner grob and calculate a list with the quarter tone diffs between the pitches of starting and ending bound. Because bending to different amounts is very unlikely, only the first element of this list is returned as a string.

`bend-spanner::print a` [Function]

Return the final stencil. A line and curve, an arrow head and a text representing the amount a string is bent.

`ly:bezier-extent control-points axis` [Function]

Compute the extent of the Bézier curve defined by *control-points* along *axis*.

`ly:bezier-extract control-points t-min t-max` [Function]

Return a sub-curve of the Bézier curve defined by *control-points*. The sub-curve is delimited by the curve points indexed by *t-min* and *t-max* (between 0 and 1, 0 = first control point, 1 = last control point). A sub-curve of a Bézier curve is in turn a Bézier curve.

`ly:book? x` [Function]

Is x a smob of class Book?

`ly:book-add-bookpart! book-smob book-part` [Function]

Add *book-part* to *book-smob* book part list.

`ly:book-add-score! book-smob score` [Function]

Add *score* to *book-smob* score list.

`ly:book-book-parts book` [Function]

Return book parts in *book*.

`book-first-page a b` [Function]

Return the 'first-page-number of the entire book.

`ly:book-header book` [Function]

Return header in *book*.

`ly:book-paper book` [Function]

Return paper in *book*.

- `ly:book-process book-smob default-paper default-layout output` [Function]
 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-process-to-systems book-smob default-paper default-layout output` [Function]
 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` [Function]
 Return scores in *book*.
- `ly:book-set-header! book module` [Function]
 Set the book header.
- `box-grob-stencil a` [Function]
 Make a box of exactly the extents of the grob. The box precisely encloses the contents.
- `box-stencil a b c` [Function]
 Add a box around *stencil*, producing a new stencil.
- `ly:bp num` [Function]
num bigpoints (1/72th inch).
- `ly:bracket a iv t p` [Function]
 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*.
- `bracketify-stencil a b c d e` [Function]
 Add brackets around *stil*, producing a new stencil.
- `break-alignable-interface::self-alignment-of-anchor a` [Function]
 Return a value for *g*'s self-alignment-X that will place *g* on the same side of the reference point defined by a break-aligned item such as a Clef.
- `break-alignable-interface::self-alignment-opposite-of-anchor a` [Function]
 Return a value for *g*'s self-alignment-X that will place *g* on the opposite side of the reference point defined by a break-aligned item such as a Clef.
- `ly:break-alignment-interface::find-nonempty-break-align-group` [Function]
 Find the BreakAlignGroup with the given break-align-symbol in this BreakAlignment. Return #f if there is no such group. Also return #f if the group has empty X-extent, which can happen if it contains only omitted items.
- `break-alignment-list a b c` [Function]
 Return a callback that calculates a value based on a grob's break direction.
- `ly:broadcast disp ev` [Function]
 Send the stream event *ev* to the dispatcher *disp*.
- `caesura-script-interface::before-line-breaking a` [Function]
 Callback for CaesuraScript grob. Eliminate scripts aligned to bar lines if they might collide with a span bar. Some types of bar lines have visible span bars and some don't. For consistent notation, we don't check whether particular SpanBar grobs are actually visible, just that they exist.

- `caesura-to-bar-line-or-divisio` *a b c* [Function]
 caesuraTypeTransform callback to print articulated caesurae as chant breath marks using the infrastructure for modern bar lines when possible.
- `caesura-to-divisio` *a b c* [Function]
 caesuraTypeTransform callback to print articulated caesurae as chant breath marks.
- `ly:cairo-output-stencil` *basename stencil paper formats* [Function]
 dump a single stencil through the Cairo backend
- `ly:cairo-output-stencils` *basename stencils header paper formats* [Function]
 dump book through cairo backend
- `calc-harmonic-pitch` *a b* [Function]
 Calculate the harmonic pitches in *music* given *pitch* as the non-harmonic pitch.
- `ly:camel-case->lisp-identifier` *name-sym* [Function]
 Convert FooBar_Bla to foo-bar-bla style symbol.
- `centered-spanner-interface::calc-x-offset` *a* [Function]
 Compute the shift from this spanner's reference point to a point centered between two non-musical columns, according to the spacing-pair property. This also takes self-alignment-X into account. The default for spacing-pair is '(break-alignment . break-alignment).
- `centered-stencil` *a* [Function]
 Center stencil *stencil* in both the x and y directions.
- `ly:chain-assoc-get` *key achain default-value strict-checking* [Function]
 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.
- `chain-assoc-get` - - [- [-]] [Function]
 - LilyPond procedure: `ly:chain-assoc-get` (SCM key, SCM achain, SCM default-value, SCM 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.
- `change-pitches` *a b* [Function]
 Recurse through *music*, applying *converter* to pitches. *converter* is typically a transposer or an inverter (see file scm/modal-transforms.scm), but may be user-defined. The converter function must take a single pitch as its argument and return a new pitch. These are LilyPond Scheme pitches, e.g., (ly:make-pitch 0 2 0).
- `check-context-path` - [-] [Function]
 Check a context property path specification *path*, a symbol list (or a single symbol), for validity and possibly complete it. Returns the completed specification, or #f when rising an error (using optionally *location*).
- `ly:check-expected-warnings` [Function]
 Check whether all expected warnings have really been triggered.

- `check-grob-path` *a rest* ... [Function]
 Check a grob path specification *path*, a symbol list (or a single symbol), for validity and possibly complete it. Returns the completed specification, or #f if invalid, optionally using *location* for an error message. If an optional keyword argument #:start *start* is given, the parsing starts at the given index in the sequence ‘Context.Grob.property.sub-property...’, with the default of ‘0’ implying the full path.
 If there is no valid first element of *path* fitting at the given path location, an optionally given #:default *default* is used as the respective element instead without checking it for validity at this position.
 The resulting path after possibly prepending *default* can be constrained in length by optional arguments #:min *min* and #:max *max*, defaulting to ‘1’ and unlimited, respectively.
- `check-music-path` *a rest* ... [Function]
 Check a music property path specification *path*, a symbol list (or a single symbol), for validity and possibly complete it. Returns the completed specification, or #f when rising an error (using optionally *location*).
- `chord-name->german-markup` *a* [Function]
 Return pitch markup for PITCH, using german note names. If B-instead-of-Bb is set to #t real german names are returned. Otherwise semi-german names (with Bb and below keeping the british names)
- `chord-name->italian-markup` *a* [Function]
 Return pitch markup for *pitch*, using Italian/French note names. If *french?* is set to #t, french ‘ré’ is returned for pitch D instead of ‘re’.
- `circle-stencil` *a b c* [Function]
 Add a circle around *stencil*, producing a new stencil.
- `clef-transposition-markup` *a b* [Function]
 The transposition sign formatting function. *oct* is supposed to be a string holding the transposition number, *style* determines the way the transposition number is displayed.
- `ly:cm` *num* [Function]
num cm.
- `collect-book-music-for-book` *a b* [Function]
 Book music handler.
- `collect-bookpart-for-book` *a* [Function]
 Top-level book-part handler.
- `collect-music-aux` *a b* [Function]
 Pass *music* to *score-handler*, with preprocessing for page layout instructions.
- `collect-music-for-book` *a* [Function]
 Top-level music handler.
- `ly:command-line-code` [Function]
 The Scheme code specified on the command line with option -e.
- `ly:command-line-options` [Function]
 The Scheme options specified on the command line with option -d.
- `comparator-from-key` *a b* [Function]
 Return a comparator function that applies *key* to the two elements and compares the results using *cmp*. Especially useful for sorting.

- `ly:connect-dispatchers` *to from* [Function]
 Make the dispatcher *to* listen to events from *from*.
- `construct-chord-elements` *a b c* [Function]
 Build a chord on *root* using modifiers in *modifications*. NoteEvents have duration *duration*.
 Notes: Natural 11 is left from chord if not explicitly specified.
 Entry point for the parser.
- `ly:context?` *x* [Function]
 Is *x* a smob of class Context?
- `ly:context-current-moment` *context* [Function]
 Return the current moment of *context*.
- `ly:context-def?` *x* [Function]
 Is *x* a smob of class Context_def?
- `ly:context-def-lookup` *def sym val* [Function]
 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* [Function]
 Return the result of applying the context-mod *mod* to the context definition *def*. Does not change *def*.
- `ly:context-event-source` *context* [Function]
 Return event-source of context *context*.
- `ly:context-events-below` *context* [Function]
 Return a stream-distributor that distributes all events from *context* and all its subcontexts.
- `ly:context-find` *context name* [Function]
 Find a parent of *context* that has name or alias *name*. Return #f if not found.
- `ly:context-grob-definition` *context name* [Function]
 Return the definition of *name* (a symbol) within *context* as an alist.
- `ly:context-id` *context* [Function]
 Return the ID string of *context*, i.e., for \context Voice = "one" ... return the string one.
- `ly:context-matched-pop-property` *context grob cell* [Function]
 This undoes a particular \override, \once \override or \once \revert when given the specific alist pair to undo.
- `ly:context-mod?` *x* [Function]
 Is *x* a smob of class Context_mod?
- `ly:context-mod-apply!` *context mod* [Function]
 Apply the context modification *mod* to *context*.
- `ly:context-name` *context* [Function]
 Return the name of *context*, i.e., for \context Voice = "one" ... return the symbol Voice.
- `ly:context-output-def` *context* [Function]
 Return the output definition of *context*.

- `ly:context-parent context` [Function]
Return the parent of *context*, #f if none.
- `ly:context-property context sym def` [Function]
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 def` [Function]
Return the context above *context* where *name* is defined, or *def* (defaulting to '()) if no such context is found.
- `ly:context-pushpop-property context grob eltprop val` [Function]
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` [Function]
Set value of property *name* in context *context* to *val*.
- `context-spec-music - - [- [-]]` [Function]
Add \context *context* = *id* \with *mods* to *m*.
- `ly:context-unset-property context name` [Function]
Unset value of property *name* in context *context*.
- `copy-repeat-chord a b c d` [Function]
Copy all events in *event-types* (be sure to include rhythmic-events) from *original-chord* over to *repeat-chord* with their articulations filtered as well. Any duration is replaced with the specified *duration*.
- `count-list a` [Function]
Given *lst* as (E1 E2 ..), return ((E1 . 1) (E2 . 2) ...).
- `create-glyph-flag a b c` [Function]
Create a flag stencil by looking up the glyph from the font.
- `cross-staff-connect a` [Function]
Set cross-staff property of the stem to this function to connect it to other stems automatically.
- `cue-substitute a` [Function]
Must happen after quote-substitute.
- `cyclic-base-value a b` [Function]
Take *value* (for example, an angle) and modulo-maps it between 0 and base *cycle*.
- `ly:debug str rest` [Function]
A Scheme callable function to issue a debug message *str*. The message is formatted with *format*; *rest* holds the formatting arguments (if any).
- `default-flag a` [Function]
Create a flag stencil for the stem. Its style is derived from the 'style Flag property. By default, lilypond uses a C++ Function (which is slightly faster) to do exactly the same as this function. However, if one wants to modify the default flags, this function can be used to obtain the default flag stencil, which can then be modified at will. The correct way to do this is:
- ```
\override Flag #'stencil = #default-flag
\override Flag #'style = #'mensural
```

`ly:default-scale` [Function]  
Get the global default scale.

`define-bar-line a b c d` [Function]  
Define a bar glyph *bar-glyph* and its substitutes at the end of a line (*eol-glyph*), at the beginning of a line (*bol-glyph*) and as a span bar (*span-glyph*). The substitute glyphs may be either strings or booleans: *#t* calls for the same value as *bar-glyph* and *#f* calls for no glyph.

`define-event-class a b` [Function]  
Defines a new event class derived from parent, a previously defined event class.

`define-event-function ...` [Macro]  
Like `define-music-function`, but the return value must be a post-event.

`define-fonts a b c` [Function]  
Return a string of all fonts used in *paper*, invoking the functions *define-font* and *define-pango-pf* for producing the actual font definition.

`define-markup-command ...` [Macro]  
Define a markup function. Syntax:

```
(define-markup-command (command layout props arg1 arg2 ...)
 (type1? type2? ...)
 [#:properties ((property1 default1)
 (property2 default2)
 ...)]
 [#:category category]
 [#:as-string expression]
 ["doc-string"]
 command-body)
```

This macro defines the markup function *command-markup*. When this function is applied as

```
(command-markup layout props arg1 arg2 ...)
```

it executes *command-body*, a sequence of S-expression similar to the body of a `define` form. The body should return a stencil.

*type1?*, *type2?*, etc., are type predicates for the arguments *arg1*, *arg2*, etc. *doc-string* is an optional description of the command; this can be retrieved using `procedure-documentation` on *command-markup*, and is used for built-in markup commands to generate the documentation.

Moreover, this macro defines a helper function *make-command-markup*, which can be applied as

```
(make-command-markup arg1 arg2 ...)
```

(without layout and props arguments). This yields a markup. Interpreting it, using `(interpret-markup markup layout props)`, invokes *command-markup* as above.

The specified properties are available as `let`-bound variables in the command body, using the respective default value as fallback in case the property is not found in props, or *#f* if no default was given. props itself is left unchanged: if you want defaults specified in that manner passed down into other markup functions, you need to adjust props yourself.

If the *as-string* named argument is given, it should be an expression, which is evaluated by `markup->string` when lossily converting markups to strings. The expression can use all variables available in the main body, namely layout, props, the arguments, and the properties. However, in many cases layout will be *#f* because such an output definition is

not available (such as for MIDI output). This case must be accounted for. The expression can recursively call `markup->string`, passing it `#:layout layout #:props props`.

The autogenerated documentation makes use of some optional specifications that are otherwise ignored:

- *category* is either a symbol or a symbol list specifying the categories for this markup command in the docs.
- As an element of the ‘properties’ list, you may directly use *command-markup* instead of a (*property default*) to indicate that this markup command is called by the newly defined command, adding its properties to the documented properties of the new command. There is no protection against circular definitions.

Some object properties are attached to the resulting *command-markup* function according to the parameters of the definition: *markup-command-signature*, *markup-function-category*, *markup-function-properties*.

`define-markup-list-command ...` [Macro]

Same as `define-markup-command`, but defines a command that, when interpreted, returns a list of stencils instead of a single one.

Markup list commands are recognizable programmatically by having the *markup-list-function?* object property to `#t`.

`define-music-function ...` [Macro]

Define and return a music function. Syntax:

```
(define-music-function (arg1 arg2 ...)
 (type1? type2? ...)
 function-body)
```

*type1?*, *type2?*, etc., can take one of the forms *predicate?* for mandatory arguments satisfying the predicate, (*predicate?*) for optional parameters of that type defaulting to `#f`, (*predicate?* *value*) for optional parameters with a specified default value (evaluated at definition time). An optional parameter can be omitted in a call only when it cannot get confused with a following parameter of different type.

A music function must return a music expression.

`define-scheme-function ...` [Macro]

Like `define-music-function`, but the return type is not restricted to music.

`define-syntax-function ...` [Macro]

Helper macro for `ly:make-music-function`. Syntax:

```
(define-syntax-function result-type?
 (arg1 arg2 ...)
 (type1? type2? ...)
 function-body)
```

See `define-music-function` for information on type predicates. *result-type?* can specify a default in the same manner as predicates, to be used in case of a type error in arguments or result.

`define-tag-group a` [Function]

Define a tag group consisting of the given *tags*, a list of symbols. Returns `#f` if successful, and an error message if there is a conflicting tag group definition.

- `define-void-function ...` [Macro]  
Like `define-music-function`, but the return value must be the special ‘\*unspecified\*’ value (i.e., what most Guile functions with “unspecified” value return). Use this when defining functions for executing actions rather than returning values, to keep LilyPond from trying to interpret the return value.
- `degrees->radians a` [Function]  
Convert the given angle from degrees to radians.
- `descend-to-context - - [- [-]]` [Function]  
Like `context-spec-music`, but only descending.
- `determine-split-list a b c` [Function]  
Event lists *evl1* and *evl2* should be ascending. *chord-range* is a pair of numbers (min . max) defining the distance in steps between notes that may be combined into a chord or unison.
- `determine-string-fret-finger a b c d` [Function]  
Determine string numbers and frets for playing *notes* as a chord, given specified information *specified-info*. *specified-info* is a list with two list elements, specified strings `defined-strings` and specified fingerings `defined-fingers`. Only a fingering of 0 will affect the fret selection, as it specifies an open string. If `defined-strings` is '(), the context property `defaultStrings` is used as a list of defined strings. Looks for predefined fretboards if `predefinedFretboardTable` is not #f. If *rest* is present, it contains the FretBoard grob, and a fretboard gets created. Otherwise, a list of (string fret finger) lists is returned. If the context-property `supportNonIntegerFret` is set #t, micro-tones are supported for TabStaff, but not for FretBoards.
- `ly:dimension? d` [Function]  
Is *d* a dimension? Used to distinguish length variables from normal numbers.
- `ly:dir? s` [Function]  
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.
- `dir-basename a rest ...` [Function]  
Strip suffixes in *rest*, but leave directory component for *file*.
- `ly:directed direction magnitude` [Function]  
Calculate 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` [Function]  
Stop the dispatcher *to* listening to events from *from*.
- `ly:dispatcher? x` [Function]  
Is *x* a smob of class Dispatcher?
- `display-lily-music - [-]` [Function]  
Display the music expression *expr* using LilyPond syntax.
- `display-music - [-]` [Function]  
Display *music*, not done with `music-map` for clarity of presentation.
- `display-scheme-music - [-]` [Function]  
Display *obj*, typically a music expression, in a friendly fashion, which often can be read back in order to generate an equivalent expression.

- `dodecaphonic-no-repeat-rule a b c` [Function]  
 An accidental rule that typesets an accidental before every note (just as in the dodecaphonic accidental style) *except* if the note is immediately preceded by a note with the same pitch. This is a common accidental style in contemporary notation.
- `ly:duration? x` [Function]  
 Is *x* a smob of class Duration?
- `ly:duration<? p1 p2` [Function]  
 Is *p1* shorter than *p2*?
- `ly:duration->string dur` [Function]  
 Convert *dur* to a string.
- `ly:duration-compress dur factor` [Function]  
 Compress *dur* by rational *factor*.
- `ly:duration-dot-count dur` [Function]  
 Extract the dot count from *dur*.
- `duration-dot-factor a` [Function]  
 Given a count of the dots used to extend a musical duration, return the numeric factor by which they increase the duration.
- `ly:duration-factor dur` [Function]  
 Extract the compression factor from *dur*. Return it as a pair.
- `ly:duration-length dur` [Function]  
 The length of the duration as a moment.
- `duration-length a` [Function]  
 Return the overall length of a duration, as a number of whole notes. (Not to be confused with `ly:duration-length`, which returns a less useful Moment object.)
- `duration-line::calc a` [Function]  
 Return list of values needed to print a stencil for DurationLine.
- `duration-line::print a` [Function]  
 Return the stencil of DurationLine.
- `ly:duration-log dur` [Function]  
 Extract the duration log from *dur*.
- `duration-log-factor a` [Function]  
 Given a logarithmic duration number, return the length of the duration, as a number of whole notes.
- `ly:duration-scale dur` [Function]  
 Extract the compression factor from *dur*. Return it as a rational.
- `duration-visual a` [Function]  
 Given a duration object, return the visual part of the duration (base note length and dot count), in the form of a duration object with non-visual scale factor 1.
- `duration-visual-length a` [Function]  
 Given a duration object, return the length of the visual part of the duration (base note length and dot count), as a number of whole notes.



`dynamic-text-spanner::before-line-breaking a` [Function]

Monitor left bound of `DynamicTextSpanner` for absolute dynamics. If found, ensure `DynamicText` does not collide with spanner text by changing 'attach-dir and 'padding. Reads the 'right-padding property of `DynamicText` to fine-tune space between the two text elements.

`ly:effective-prefix` [Function]

Return effective prefix. For example, if LilyPond Scheme files are stored in directory /foo/bar/scm and PS files in /foo/bar/ps, the effective prefix is /foo/bar.

`elbowed-hairpin a b` [Function]

Create hairpin based on a list of *coords* in (cons x y) form. x is the portion of the width consumed for a given line and y is the portion of the height. For example, '((0 . 0) (0.3 . 0.7) (0.8 . 0.9) (1.0 . 1.0)) means that at the point where the hairpin has consumed 30% of its width, it must be at 70% of its height. Once it is to 80% width, it must be at 90% height. It finishes at 100% width and 100% height. If *coords* does not begin with '(0 . 0) the final hairpin may have an open tip. For example '(0 . 0.5) will cause an open end of 50% of the usual height.

*mirrored?* indicates if the hairpin is mirrored over the y axis or if just the upper part is drawn.

Returns a function that accepts a hairpin grob as an argument and draws the stencil based on its coordinates.

```
#(define simple-hairpin
 (elbowed-hairpin '((0 . 0)(1.0 . 1.0)) #t))

\relative c' {
 \override Hairpin #'stencil = #simple-hairpin
 a\p\< a a a\f
}
```

`ellipse-stencil a b c d` [Function]

Add an ellipse around *stencil*, padded by the padding pair, producing a new stencil.

`end-broken-spanner? a` [Function]

Is *spanner* broken *and* the last of its broken siblings? See also `unbroken-or-last-broken-spanner?`.

`ly:engraver-announce-end-grob engraver grob cause` [Function]

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` [Function]

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:engraver-make-item engraver grob-name cause` [Function]

Same as `ly:engraver-make-grob`, but always create a grob with the Item class. This is useful when the same grob definition is used to create grobs of differing classes.

`ly:engraver-make-spanner engraver grob-name cause` [Function]

Same as `ly:engraver-make-grob`, but always create a grob with the Spanner class. This is useful when the same grob definition is used to create grobs of differing classes.

- `ly:engraver-make-sticky` *engraver grob-name host cause* [Function]  
 Utility function to create a grob sticking to another grob. This acts like either `ly:engraver-make-item` or `ly:engraver-make-spanner`, depending on the class of the host. Additionally, the host is made the parent of the newly created sticky grob on the y axis and, for items, on the x axis. Sticky spanners take their bounds from their host and their end is announced with the end of the host.  
 Sticky grobs must have the `sticky-grob-interface` interface, see Section “sticky-grob-interface” in *Internals Reference*.
- `ly:error` *str rest* [Function]  
 A Scheme callable function to issue the error *str*. The error is formatted with `format`; *rest* holds the formatting arguments (if any).
- `eval-carefully` *a b rest ...* [Function]  
 Check whether all symbols in expression *symbol* are reachable in module *module*. In that case evaluate, otherwise print a warning and set an optional *default*.
- `ly:event?` *obj* [Function]  
 Is *obj* a proper (non-rhythmic) Event object?
- `event-chord-notes` *a* [Function]  
 Return a list of all notes from *event-chord*.
- `event-chord-pitches` *a* [Function]  
 Return a list of all pitches from *event-chord*.
- `event-chord-reduce` *a* [Function]  
 Reduce event chords in *music* to their first note event, retaining only the chord articulations. Returns the modified music.
- `event-chord-wrap!` *a* [Function]  
 Wrap isolated rhythmic events and non-postevent events in *music* inside of an EventChord. Chord repeats ‘q’ are expanded using the default settings of the parser.
- `ly:event-deep-copy` *m* [Function]  
 Copy *m* and all sub-expressions of *m*.
- `event-has-articulation?` *a b* [Function]  
 Is *event-type* in the articulations list of the music causing *stream-event*?
- `ly:event-property` *sev sym val* [Function]  
 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* [Function]  
 Set property *sym* in event *ev* to *val*.
- `expand-repeat-chords!` *a b* [Function]  
 Walk through *music* and fill repeated chords (notable by having a duration in `duration`) with the notes from their respective predecessor chord.
- `expand-repeat-notes!` *a* [Function]  
 Walk through *music* and give pitchless notes (not having a pitch in `pitch` or a drum type in `drum-type`) the pitch(es) from the predecessor note/chord if available.

- `ly:expect-warning str rest` [Function]  
 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 is shown. The message should be translated with (`_ ...`) and changing parameters given after the format string.
- `extract-beam-exceptions a` [Function]  
 Create a value useful for setting beamExceptions from *music*.
- `extract-music a b` [Function]  
 Return a flat list of all music matching *pred?* inside of *music*, not recursing into matches themselves.
- `extract-named-music a b` [Function]  
 Return a flat list of all music named *music-name* (either a single event symbol or a list of alternatives) inside of *music*, not recursing into matches themselves.
- `ly:extract-subfont-from-collection collection-file-name idx subfont-file-name` [Function]  
 Extract the subfont of index *idx* in TrueType collection (TTC) or OpenType/CFF collection (OTC) file *collection-file-name* and write it to file *subfont-file-name*.
- `extract-typed-music a b` [Function]  
 Return a flat list of all music with *type* (either a single type symbol or a list of alternatives) inside of *music*, not recursing into matches themselves.
- `ly:find-file name` [Function]  
 Return the absolute file name of *name*, or #f if not found.
- `find-named-props a b` [Function]  
 Used by `\magnifyMusic` and `\magnifyStaff`. If *grob-descriptions* is equal to the *all-grob-descriptions* alist (defined in `scm/define-grobs.scm`), this finds all grobs that can have a value for the *prop-name* property, and return them as a list in the following format:
- ```
'((grob prop-name)
  (grob prop-name)
  ...)
```
- `find-pitch-entry a b c d` [Function]
 Return the first entry in *keysig* that matches *pitch* by notename and octave. Alteration is not considered. *accept-global* states whether key signature entries should be included. *accept-local* states whether local accidentals should be included. If no matching entry is found, #f is returned.
- `finger-glide::print a` [Function]
 The stencil printing procedure for grob `FingerGlideSpanner`. Depending on the grob property style several forms of appearance are printed. Possible settings for grob property style are zigzag, trill, dashed-line, dotted-line, stub-left, stub-right, stub-both, bow, none and line, which is the default.
- `first-assoc a b` [Function]
 Return first successful assoc of key from *keys* in *lst*.
- `first-broken-spanner? a` [Function]
 Is *spanner* broken *and* the first of its broken siblings? See also `unbroken-or-first-broken-spanner?`.

- `first-member` *a b* [Function]
Return first successful member (of member) from *members* in *lst*.
- `flat-flag` *a* [Function]
Flat flag style. The angles of the flags are both 0 degrees.
- `flatten-list` *a* [Function]
Unnest list.
- `flip-stencil` *a b* [Function]
Flip stencil *stil* in the direction of *axis*. Value X (or 0) for *axis* flips it horizontally. Value Y (or 1) flips it vertically. *stil* is flipped in place; its position, the coordinates of its bounding box, remains the same.
- `fold-some-music` *a b c d* [Function]
This works recursively on music like `fold` does on a list, calling ‘(pred? music)’ on every music element. If #f is returned for an element, it is processed recursively with the same initial value of ‘previous’, otherwise ‘(proc music previous)’ replaces ‘previous’ and no recursion happens. The top *music* is processed using *init* for ‘previous’.
- `ly:font-config-add-directory` *dir* [Function]
Add directory *dir* to FontConfig.
- `ly:font-config-add-font` *font* [Function]
Add font *font* to FontConfig.
- `ly:font-config-display-fonts` [Function]
Dump a list of all fonts visible to FontConfig.
- `ly:font-config-get-font-file` *name* [Function]
Get the file for font *name*, as found by FontConfig.
- `ly:font-design-size` *font* [Function]
Given the font metric *font*, return the design size, relative to the current output-scale.
- `ly:font-file-name` *font* [Function]
Given the font metric *font*, return the corresponding file name.
- `ly:font-get-glyph` *font name* [Function]
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* [Function]
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* [Function]
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-index-to-charcode` *font index* [Function]
 Return the character code for *index* 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* [Function]
 Given the font metric *font*, return the magnification, relative to the current output-scale.
- `ly:font-metric?` *x* [Function]
 Is *x* a smob of class `Font_metric`?
- `ly:font-name` *font* [Function]
 Given the font metric *font*, return the corresponding name.
- `font-name-split` *a* [Function]
 Return (*font-name* . *design-size*) from *font-name* string or #f.
- `ly:font-sub-fonts` *font* [Function]
 Given the font metric *font* of an OpenType font, return the names of the subfonts within *font*.
- `for-some-music` *a b* [Function]
 Walk through *music*, process all elements calling *stop?* and only recurse if this returns #f.
- `ly:format` *str rest* [Function]
 LilyPond specific format function, supporting ~a and ~[0-9]f. Basic support for ~s is also provided.
- `ly:format-output` *context* [Function]
 Given a global context in its final state, process it and return the `Music_output` object in its final state.
- `format-segno-mark-considering-bar-lines` *a b* [Function]
 When bar lines incorporate segni, print no mark for the first segno because that would be redundant. Print the usual marks for later segni to avoid ambiguity.
- `fret->pitch` *a* [Function]
 Calculate a pitch given *fret* for the harmonic.
- `fret-parse-terse-definition-string` *a b* [Function]
 Parse a fret diagram string that uses terse syntax; return a pair containing *props*, modified to include the string-count determined by *definition-string*, and a fret indication list with the appropriate values.
- `function-chain` *a b* [Function]
 Apply a list of functions in *function-list* to *arg*. Each element of *function-list* is structured (cons function '(arg2 arg3 ...)). If function takes arguments besides *arg*, they are provided in *function-list*. Example:

$$(\text{function-chain } 1 \text{ ``}((,+ 1) (- 2) (+ 3) (,/))) \\ \Rightarrow 1/3$$
- `generate-crop-stencil` *a* [Function]
 Returns a stencil for the cropped output of the given `Paper-book`
- `generate-preview-stencil` *a* [Function]
 Returns a stencil for a preview of given `Paper-book`

- `ly:generic-bound-extent` *grob common* [Function]
 Determine the extent of *grob* relative to *common* along the x axis, finding its extent as a bound when it 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.
- `get-bound-note-heads` *a* [Function]
 Take a spanner *grob* and return a pair containing all note heads of the initial starting and the final `NoteColumn`.
- `ly:get-cff-offset` *font-file-name idx* [Function]
 Get the offset of the ‘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.
- `get-chord-shape` *a b c* [Function]
 Return the chord shape associated with *shape-code* and *tuning* in the hash-table *base-chord-shapes*.
- `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.
- `get-postscript-bbox` *a* [Function]
 Extract the bounding box from *string*, or return #f if not present.
- `ly:get-spacing-spec` *from-scm to-scm* [Function]
 Return the spacing spec going between the two given grobs, *from-scm* and *to-scm*.
- `get-tweakable-music` *a* [Function]
 When tweaking music, return a list of music expressions where the tweaks should be applied. Relevant for music wrappers and event chords.
- `glyph-flag` *a* [Function]
 Simulate the default way of generating flags: Look up `glyphs.flags.style[ud][1234]` from the feta font and use it for the flag stencil.
- `ly:grob?` *x* [Function]
 Is *x* a smob of class `Grob`?
- `grob::all-objects` *a* [Function]
 Return a list of the names and contents of all properties having type `ly:grob?` or `ly:grob-array?` for all interfaces supported by *grob*.

- `grob::compose-function a b` [Function]
 Create a callback entity *func* to be stored in a grob property, based on the grob property data *data* (which can be plain data, a callback itself, or an unpure-pure container).
 Function or unpure-pure container *func* accepts a grob and a value and returns another value. Depending on the type of *data*, *func* is used for building a grob callback or an unpure-pure container.
- `grob::display-objects a` [Function]
 Display all objects stored in properties of grob *grob*.
- `grob::inherit-parent-property a b rest ...` [Function]
grob callback generator for inheriting a *property* from an *axis* parent, defaulting to *default* if there is no parent or the parent has no setting.
- `grob::name a` [Function]
 Return the name of the grob *grob* as a symbol.
- `grob::offset-function a b rest ...` [Function]
 Create a callback entity *func* to be stored in a grob property, based on the grob property data *data* (which can be plain data, a callback itself, or an unpure-pure container).
 Function *func* accepts a grob and returns a value that is added to the value resulting from *data*. Optional argument *plus* defaults to '+' but may be changed to allow for using a different underlying accumulation.
 If *data* is #f or '(), it is not included in the sum.
- `grob::relay-other-property a` [Function]
grob callback generator for returning the value of another property, which is identified by the symbol *property*.
- `grob::rhythmic-location a` [Function]
 Return a pair consisting of the measure number and moment within the measure of grob *grob*.
- `grob::unpure-Y-extent-from-stencil a` [Function]
 The unpure height will come from a stencil whereas the pure height will come from pure-function.
- `grob::when a` [Function]
 Return the global timestep (a Moment) of grob *grob*.
- `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 smob of class Grob_array?
- `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 *index*th 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* [Function]
Find the common refpoint of *grob* and *other* for *axis*.
- `ly:grob-common-refpoint-of-array` *grob others axis* [Function]
Find the common refpoint of *grob* and *others* (a grob-array) for *axis*.
- `ly:grob-default-font` *grob* [Function]
Return the default font for grob *grob*.
- `ly:grob-extent` *grob refp axis* [Function]
Get the extent in *axis* direction of *grob* relative to the grob *refp*.
- `ly:grob-get-vertical-axis-group-index` *grob* [Function]
Get the index of the vertical axis group the grob *grob* belongs to; return -1 if none is found.
- `ly:grob-interfaces` *grob* [Function]
Return the interfaces list of grob *grob*.
- `ly:grob-layout` *grob* [Function]
Get \layout definition from grob *grob*.
- `ly:grob-list->grob-array` *grob-list* [Function]
Convert a Scheme list of grobs to a grob array.
- `ly:grob-object` *grob sym val* [Function]
Return the value of a pointer in grob *grob* of property *sym*. When *sym* is undefined in *grob*, it returns *val* if specified or '() (end-of-list) otherwise. The kind of properties this taps into differs from regular properties. It is used to store links between grobs, either grobs or grob arrays. For instance, a note head has a stem property, the stem grob it belongs to. Just after line breaking, all those grobs are scanned and replaced by their relevant broken versions when applicable.
- `ly:grob-original` *grob* [Function]
Return the unbroken original grob of *grob*, *grob* may be an item or spanner.
- `ly:grob-parent` *grob axis def* [Function]
Get the parent of *grob*. *axis* is 0 for the x axis, 1 for the y axis. If *grob* has no parent on this axis (yet), return *def*, or '() if *def* is not specified.
- `ly:grob-pq<?` *a b* [Function]
Compare two grob priority queue entries. This is an internal function.
- `ly:grob-properties?` *x* [Function]
Is *x* a smob of class `Grob_properties`?
- `ly:grob-property` *grob sym val* [Function]
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* [Function]
Return the value for property *sym* of *grob*, but do not process callbacks.

- `ly:grob-pure-height grob refp beg end val` [Function]
Return the pure height of *grob* given reffpoint *refp*. If no value is found, return *val* or '()' if *val* is not specified.
- `ly:grob-pure-property grob sym beg end val` [Function]
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` [Function]
Get the coordinate in *axis* direction of *grob* relative to the grob *refp*.
- `ly:grob-robust-relative-extent grob refp axis` [Function]
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` [Function]
Compare two grobs by script priority. For internal use.
- `ly:grob-set-nested-property! grob symlist val` [Function]
Set nested property *symlist* in grob *grob* to value *val*.
- `ly:grob-set-object! grob sym val` [Function]
Set *sym* in grob *grob* to value *val*.
- `ly:grob-set-parent! grob axis parent-grob` [Function]
Set *parent-grob* as the parent of grob *grob* in axis *axis*.
- `ly:grob-set-property! grob sym val` [Function]
Set *sym* in grob *grob* to value *val*.
- `ly:grob-spanned-column-rank-interval grob` [Function]
Return 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` [Function]
Return the y position of *sg* relative to the staff.
- `ly:grob-suicide! grob` [Function]
Kill *grob*.
- `ly:grob-system grob` [Function]
Return the system grob of *grob*.
- `grob-transformer a b` [Function]
Create an override value good for applying *func* to either pure or unpure values. *func* is called with the respective grob as first argument and the default value (after resolving all callbacks) as the second.
- `ly:grob-translate-axis! grob d a` [Function]
Translate *grob* on axis *a* over distance *d*.
- `ly:grob-vertical<? a b` [Function]
Does *a* lie above *b* on the page?
- `ly:gulp-file name size` [Function]
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:gulp-file-utf8` *name size* [Function]
 Read *size* characters from the file *name*, and return its contents in a string decoded from UTF-8. 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* [Function]
 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* [Function]
 Return a list of keys in *tab*.
- `headers-property-alist-chain` *a* [Function]
 Take a list of `\header` blocks (Guile modules). Return an alist chain containing all of their bindings where the names have been prefixed with `header:`. This alist chain is suitable for interpreting a markup in the context of these headers.
- `hook-stencil` *a b c d e f* [Function]
 Return a hook stencil where *x* determines the horizontal position and *y* determines the basic vertical position. The final stencil is adjusted vertically using *staff-space*, which is `StaffSymbol`'s staff space, and uses *blot*, which is the current 'blot-diameter. The stencil's thickness is usually taken from *grob* 'details, *thick* serves as a fallback value.
- `ly:in-event-class?` *a b* [Function]
 Does event *ev* belong to event class *cl*?
- `ly:inch` *num* [Function]
num inches.
- `ly:input-both-locations` *sip* [Function]
 Return input location in *sip* as
 (file-name first-line first-column last-line last-column)
- `ly:input-file-line-char-column` *sip* [Function]
 Return input location in *sip* as (file-name line char column).
- `ly:input-location?` *x* [Function]
 Is *x* a smob of class `Input`?
- `ly:input-message` *sip msg rest* [Function]
 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* [Function]
 Print *msg* as a GNU compliant warning message, pointing to the location in *sip*. *msg* is interpreted similar to `format`'s argument, using *rest*.
- `interpret-markup` - - - [Function]
 - LilyPond procedure: `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:interpret-music-expression mus ctx` [Function]
Interpret the music expression *mus* in the global context *ctx*. The context is returned in its final state.
- `interval-center a` [Function]
Center the number pair *x*, if an interval.
- `interval-index a b` [Function]
Interpolate *interval* between between left (*dir*=-1) and right (*dir*=+1).
- `interval-length a` [Function]
Length of the number pair *x*, if an interval.
- `ly:intlog2 d` [Function]
The 2-logarithm of 1/*d*.
- `invalidate-alterations a` [Function]
Invalidate alterations in *context*.
Elements of 'localAlterations corresponding to local alterations of the key signature have the form '((octave . notename) . (alter barnum . end-mom)). Replace them with a version where alter is set to 'clef to force a repetition of accidentals.
Entries that conform with the current key signature are not invalidated.
- `ly:item? g` [Function]
Is *g* an Item object?
- `item::extra-spacing-height-including-staff a` [Function]
Return a value for extra-spacing-height that augments the extent of the grob to the extent of the staff.
- `ly:item-break-dir it` [Function]
The break status direction of item *it*. -1 means end of line, 0 unbroken, and 1 beginning of line.
- `ly:item-get-column it` [Function]
Return the PaperColumn or NonMusicalPaperColumn associated with this Item.
- `ly:iterator? x` [Function]
Is *x* a smob of class Music_iterator?
- `layout-line-thickness a` [Function]
Get the line thickness of the *grob*'s corresponding layout.
- `layout-set-absolute-staff-size a` [Function]
Set the absolute staff size inside of a \layout{} block. *sz* is in points.
- `layout-set-staff-size a` [Function]
Set the staff size inside of a \layout{} block. *sz* is in points.
- `ly:length x y` [Function]
Calculate 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:lily-lexer? x` [Function]
Is *x* a smob of class Lily_lexer?

<code>ly:lily-parser? x</code>	[Function]
Is <i>x</i> a smob of class <code>Lily_parser</code> ?	
<code>lilypond-main a</code>	[Function]
Entry point for LilyPond.	
<code>lilypond-version-outdated? a b</code>	[Function]
Is <i>file-version</i> outdated compared to <i>lily-version</i> ? This is defined as a version that is from a lower release series (corresponding to the first two numbers of the version) or a version from the same <i>unstable</i> release series (odd minor version number) with a lower patch level (third number). A stable version from the same series does not count as outdated because compatibility is preserved.	
<code>ly:line-interface::line grob startx starty endx endy</code>	[Function]
Make a line using layout information from grob <i>grob</i> .	
<code>list-insert-separator a b</code>	[Function]
Create new list, inserting <i>between</i> between elements of <i>lst</i> .	
<code>list-join a b</code>	[Function]
Put <i>intermediate</i> between all elements of <i>lst</i> .	
<code>ly:listened-event-class? disp cl</code>	[Function]
Does <i>disp</i> listen to any event type in the list <i>cl</i> ?	
<code>ly:listened-event-types disp</code>	[Function]
Return a list of all event types that <i>disp</i> listens to.	
<code>ly:listener? x</code>	[Function]
Is <i>x</i> a smob of class <code>Listener</code> ?	
<code>lookup-markup-command a</code>	[Function]
Return (<i>function</i> . <i>signature</i>) for a markup command <i>code</i> , or return <code>#f</code> .	
<code>lyric-hyphen::vaticana-style a</code>	[Function]
Draw a <code>LyricHyphen</code> grob as needed for Gregorian chant in Editio Vaticana style, that is, apply it once, flush-left. If the text property of <code>LyricHyphen</code> is set, print this markup. If the property is not set, use a hyphen character.	
<code>lyric-text::print a</code>	[Function]
Allow interpretation of tildes as lyric tying marks.	
<code>make-accidental-dodecaphonic-rule a b</code>	[Function]
Variation on function <code>make-accidental-rule</code> that creates an dodecaphonic accidental rule.	
<code>make-accidental-rule a b</code>	[Function]
Create an accidental rule that makes its decision based on the octave of the note and a laziness value.	
<i>octaveness</i> is either 'same-octave or 'any-octave and defines whether the rule should respond to accidental changes in other octaves than the current. 'same-octave is the normal way to typeset accidentals – an accidental is made if the alteration is different from the last active pitch in the same octave. 'any-octave looks at the last active pitch in any octave.	
<i>laziness</i> states over how many bars an accidental should be remembered. 0 is the default – accidental lasts over 0 bar lines, that is, to the end of current measure. A positive integer means that the accidental lasts over that many bar lines. -1 is 'forget immediately', that is, only look at key signature. <code>#t</code> is 'forever'.	

- `ly:make-book` *paper header scores* [Function]
 Make a \book of *paper* and *header* (which may be #f as well) containing \scores.
- `ly:make-book-part` *scores* [Function]
 Make a \bookpart containing \scores.
- `make-bow-stencil` *a b c d e f* [Function]
 Create a bow stencil. It starts at point *start*, ends at point *stop*. *thickness* is the thickness of the bow. The higher the value of number *angularity*, the more angular the shape of the bow. *bow-height* determines the height of the bow. *orientation* determines whether the bow is concave or convex. Both variables are supplied to support independent usage.
 Done by calculating a horizontal unit bow first, then moving all control points to the correct positions. Limitation: s-curves are currently not supported.
- `make-c-time-signature-markup` *a* [Function]
 Make markup for the ‘C’ time signature style.
- `make-circle-stencil` *a b c* [Function]
 Make a circle of radius *radius* and thickness *thickness*.
- `make-clef-set` *a* [Function]
 Generate the clef setting commands for a clef with name *clef-name*.
- `make-connected-line` *a b* [Function]
 Take a list of points, *points*. Return a line connecting *points*, using `ly:line-interface::line` and getting layout information from *grob*.
- `make-connected-path-stencil` *a b c d e f* [Function]
 Make a connected path described by the list *pointlist*, beginning at point (0, 0), with thickness *thickness*, and scaled by *x-scale* in the x direction and *y-scale* in the y direction. *connect* and *fill* are boolean arguments that specify whether the path should be connected or filled, respectively.
- `ly:make-context-mod` *mod-list* [Function]
 Create a context modification, optionally initialized via the list of modifications *mod-list*.
- `make-cue-clef-set` *a* [Function]
 Generate the clef setting commands for a cue clef with name *clef-name*.
- `make-cue-clef-unset` [Function]
 Reset the clef settings for a cue clef.
- `ly:make-dispatcher` [Function]
 Return a newly created dispatcher.
- `ly:make-duration` *length dotcount num den* [Function]
 Make a duration. *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.
- `make-duration-of-length` *a* [Function]
 Make duration of the given moment length.

- `make-ellipse-stencil` *a b c d* [Function]
 Make an ellipse of x radius *x-radius*, y radius *y-radius*, and thickness *thickness* with fill defined by *fill*.
- `make-engraver` ... [Macro]
 Like `make-translator`, but create an engraver, i.e., the resulting translator is only run in layout output and ignored in MIDI.
- `make-filled-box-stencil` *a b* [Function]
 Make a filled box.
- `ly:make-global-context` *output-def* [Function]
 Set up a global interpretation context, using the output block *output-def*. The context is returned.
- `ly:make-global-translator` *global* [Function]
 Create a translator group and connect it to the global context *global*. The translator group is returned.
- `make-glyph-time-signature-markup` *a b* [Function]
 Make markup for a symbolic time signature of the form `timesig.<style><numerator><denominator>`, for example ‘`timesig.mensural34`’. If the music font does not have a glyph for the requested style and fraction, issue a warning and make a numbered time signature instead.
- `ly:make-grob-properties` *alist* [Function]
 Package the given property list *alist* in a grob property container stored in a context property with the name of a grob.
- `make-grob-property-override` *a b c* [Function]
 Make a Music expression that overrides *gprop* to *val* in *grob*. This is a `\temporary \override`, making it possible to `\revert` to any previous value afterwards.
- `make-grob-property-revert` *a b* [Function]
 Revert the grob property *gprop* for *grob*.
- `make-grob-property-set` *a b c* [Function]
 Make a Music expression that overrides a *gprop* to *val* in *grob*. Does a pop first, i.e., this is not a `\temporary \override`.
- `make-harmonic` *a* [Function]
 Convert music variable *mus* to harmonics.
- `make-line-stencil` *a b c d e* [Function]
 Make a line stencil of given line width and set its extents accordingly.
- `ly:make-listener` *a* [Function]
 This is a compatibility wrapper for creating a ‘listener’ for use with `ly:add-listener` from a *callback* taking a single argument. Since listeners are equivalent to callbacks, this is no longer needed.
- `make-modal-inverter` *a b c* [Function]
 Wrapper function for `inverter-factory`.
- `make-modal-transposer` *a b c* [Function]
 Wrapper function for `transposer-factory`.

`ly:make-moment m g gn gd` [Function]

Create a 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` [Function]

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.

`make-music a rest ...` [Function]

Create a music object of given name, and set its properties according to `music-properties`, a list of alternating property symbols and values. Example:

```
(make-music 'OverrideProperty
            'symbol 'Stem
            'grob-property 'thickness
            'grob-value (* 2 1.5))
```

Instead of a successive symbol and value, an entry in the list may also be an alist or a music object in which case its elements, respectively its *mutable* property list (properties not inherent to the type of the music object), are taken.

The argument list will be interpreted left to right, so later entries override earlier ones.

`ly:make-music-function signature func` [Function]

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` [Function]

Make *music* relative to *pitch*, return final pitch.

`ly:make-output-def` [Function]

Make an output definition.

`make-oval-stencil a b c d` [Function]

Make an oval from two Bézier curves, of x radius *x-radius*, y radius *y-radius*, and thickness *thickness* with fill defined by *fill*.

`ly:make-page-label-marker label` [Function]

Return page marker with label *label*.

`ly:make-page-permission-marker symbol permission` [Function]

Return page marker with page breaking and turning permissions.

`ly:make-pango-description-string chain size` [Function]

Make a PangoFontDescription string for the property alist *chain* at size *size*.

`ly:make-paper-outputter port alist default-callback` [Function]

Create an outputter dumping to *port*. *alist* should map symbols to procedures. See file `output-ps.scm` for an example. If *default-callback* is given, it is called for unsupported expressions.

`make-part-combine-context-changes` *a b* [Function]

Generate a sequence of part combiner context changes from a split list.

`make-part-combine-marks` *a b* [Function]

Generate a sequence of part combiner events from a split list.

`make-partial-ellipse-stencil` *a b c d e f g* [Function]

Create an elliptical arc. *x-radius* is the x radius of the arc. *y-radius* is the y radius of the arc. *start-angle* is the starting angle of the arc (in degrees). *end-angle* is the ending angle of the arc (in degrees). *thick* is the thickness of the line. *connect* is a boolean flag indicating whether the end should be connected to the start by a line. *fill* is a boolean flag indicating whether the shape should be filled.

`make-path-stencil` *- - - - #:line-cap-style line-cap-style
#:line-join-style line-join-style* [Function]

Make a stencil based on the path described by the list *path*, with thickness *thickness*, and scaled by *x-scale* in the x direction and *y-scale* in the y direction (the difference with scaling the resulting stencil using `ly:stencil-scale` is that this scaling does not change the thickness). *fill* is a boolean argument that specifies whether the path should be filled. Valid path commands are

`moveto rmoveto lineto rlineto curveto rcurveto closepath`

and their standard SVG single-letter equivalents

`M m L l C c Z z`

`make-performer` ... [Macro]

Like `make-translator`, but create a performer, i.e., the resulting translator is only run in MIDI and ignored in layout output. Scheme performers do not support acknowledgers and `process-acknowledged`.

`ly:make-pitch` *octave note alter* [Function]

Make a pitch. *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* [Function]

Create a Prob object.

`make-relative` ... [Macro]

The list of pitch or music variables in *variables* is used as a sequence for creating relativable music from *music*.

When the constructed music is used outside of `\relative`, it just reflects plugging in the *variables* into *music*.

The action inside of `\relative`, however, is determined by first relativizing the surrogate *reference* with the variables plugged in and then using the variables relativized as a side effect of relativizing *reference* for evaluating *music*.

Since pitches don't have the object identity required for tracing the effect of the reference call, they are replaced *only* for the purpose of evaluating *reference* with simple pitched note events.

The surrogate *reference* expression has to be written with that in mind. In addition, it must *not* contain *copies* of music that is supposed to be relativized but rather the *originals*. This *includes* the pitch expressions. As a rule, inside of `#{...#}` variables must *only* be introduced using `#`, never via the copying construct `$`. The reference expression will usually just be a

sequential or chord expression naming all variables in sequence, implying that following music will be relativized according to the resulting pitch of the last or first variable, respectively.

Since the usual purpose is to create more complex music from general arguments and since music expression parts must not occur more than once, one *does* generally need to use copying operators in the *replacement* expression *music* when using an argument more than once there. Using an argument more than once in *reference*, in contrast, does not make sense.

There is another fine point to mind: *music* must *only* contain freshly constructed elements or copied constructs. This will be the case anyway for regular LilyPond code inside of `#{...#}`, but any other elements (apart from the *variables* themselves which are already copied) must be created or copied as well.

The reason is that it is usually permitted to change music in-place as long as one does a *ly:music-deep-copy* on it, and such a copy of the whole resulting expression will *not* be able to copy variables/values inside of closures where the information for relativization is being stored.

`make-repeat a b c d` [Function]

Create a repeat music expression, with all properties initialized properly.

`ly:make-rotation angle center` [Function]

Make a transform rotating by *angle* in degrees. If *center* is given as a pair of coordinates, it is the center of the rotation, otherwise the rotation is around (0, 0).

`ly:make-scale steps` [Function]

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-scaling scale scaley` [Function]

Create a scaling transform from argument *scale* and optionally *scaley*. When both arguments are given, they must be real and give the scale in x and y direction. If only *scale* is given, it may also be complex to indicate a scaled rotation in the manner of complex number rotations, or a pair of reals for specifying different scales in x and y direction like with the first calling convention.

`ly:make-score music` [Function]

Return score with *music* encapsulated in it.

`make-semitone->pitch a` [Function]

Convert *pitches*, an unordered list of note values covering (after disregarding octaves) all absolute pitches in need of conversion, into a function converting semitone numbers (absolute pitch missing enharmonic information) back into note values.

For a key signature without accidentals

`c cis d es e f fis g gis a bes b`

might be a good choice, covering Bb major to A major and their parallel keys, and melodic/harmonic C minor to A minor.

`ly:make-skyline segments axis direction` [Function]

Create a new skyline from a list of segments. A skyline is an object representing an outline along a 'horizon axis', much like a city skyline. The argument *segments* is a list of segments. A segment has the form `'((x1 . y1) . (x2 . y2))`. The resulting skyline, viewed on the given *axis*, has a building joining these two points for each segment. *x1*, *y1*, *x2*, *y2* may be infinite. The buildings can be given in any order, and overlap.

`ly:make-spring ideal min-dist` [Function]

Make a spring. *ideal* is the ideal distance of the spring, and *min-dist* is the minimum distance.

`ly:make-stencil expr xext yext` [Function]

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.

`make-stencil-boxer a b c` [Function]

Return function that adds a box around the grob passed as argument.

`make-stencil-circler a b c` [Function]

Return function that adds a circle around the grob passed as argument.

`ly:make-stream-event cl proplist` [Function]

Create a stream event of class *cl* with the given mutable property list.

`make-tmpfile a` [Function]

Return a temporary file (as a Scheme port). If *dir* is `#f`, a file in the directory given by the environment variable `$TMPDIR` is created.

`ly:make-transform xx yx xy yy x0 y0` [Function]

Create a transform. Without options, it is the identity transform. Given four arguments *xx*, *yx*, *xy*, and *yy*, it is a linear transform. Given six arguments (with *x0* and *y0* last), it is an affine transform.

Transforms can be called as functions on other transforms (concatening them) or on points given either as complex number or real number pair. See also `ly:make-rotation`, `ly:make-scaling`, and `ly:make-translation`.

`ly:make-translation x y` [Function]

Make a transform translating by *x* and *y*. If only *x* is given, it can also be a complex number or a pair of numbers indicating the offset to use.

`make-translator ...` [Macro]

Helper macro for creating Scheme translators usable in both ‘`\midi`’ and ‘`\layout`’.

The usual form for a translator is an association list (or alist) mapping symbols to either anonymous functions or to another such alist.

`make-translator` accepts forms where the first element is either an argument list starting with the respective symbol, followed by the function body (comparable to the way `define` is used for defining functions), or a single symbol followed by subordinate forms in the same manner. You can also just make an alist pair literally (the ‘`car`’ is quoted automatically) as long as the unevaluated ‘`cdr`’ is not a pair. This is useful if you already have defined your engraver functions separately.

Symbols mapping to a function would be `initialize`, `start-translation-timestep`, `pre-process-music`, `process-music`, `stop-translation-timestep`, and `finalize`. Symbols mapping to another alist specified in the same manner are `listeners` with the subordinate symbols being event classes.

A template for writing a translator with all methods is:

```
(lambda (context)
  (let (local-variables ...)
    (make-translator
      ((initialize translator)
       ...))
```

```

((start-translation-timestep translator)
 ...)
(listeners
 ((event-class-1 translator event)
 ...)
 ((event-class-2 translator event #:once)
 ...))
(process-music translator)
 ...)
(acknowledgers
 ((grob-interface-1 translator grob source-translator)
 ...)
 ((grob-interface-2 translator grob source-translator)
 ...))
(process-acknowledged translator)
 ...)
((stop-translation-timestep translator)
 ...)
(finalize translator)
 ...))))

```

This can be used as the argument to `\consists`.

For `listeners`, a special feature is available: the argument list of a listener can be terminated with the keyword `#:once`. This makes for a listener that is only ever triggered once per time step. If it receives several events in the same time step, it emits a warning, except if they are all equal (where equality is checked recursively, with `equal?`).

`make-transparent-box-stencil a b` [Function]
 Make a transparent box.

`ly:make-unpure-pure-container unpure pure` [Function]
 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.

`map-selected-alist-keys a b c` [Function]
 Return *alist* with *function* applied to all of the values in list *keys*. Example:

```

(map-selected-alist-keys - '(a b) '((a . 1) (b . -2) (c . 3) (d . 4)))
⇒ ((a . -1) (b . 2) (c . 3) (d . 4))

```

`map-some-music a b` [Function]
 Walk through *music*, transform all elements calling *map?* and only recurse if this returns `#f`. elements or articulations that are not music expressions are discarded: this allows some amount of filtering.

`map-some-music` may overwrite the original *music*.

`marked-up-headfoot a b` [Function]
 Read variables *what-odd* and *what-even* from the page's layout. Interpret either of them as markup, with properties reflecting the variables in the page's layout and header modules.

`marked-up-title a` [Function]
 Read variables *what-odd* and *what-even* from the page's layout. Interpret either of them as markup, with properties reflecting the variables in the page's layout and header modules.

`markup ...` [Macro]

The `markup` macro provides a LilyPond-like syntax for building markups using Scheme keywords, replacing `\command` with `#:command`. For example, this:

```
\markup { foo
  \raise #0.2 \hbracket \bold bar
  \override #'(baseline-skip . 4)
  \bracket \column { baz bazr bla }
}
```

translates to this:

```
(markup "foo"
  #:raise 0.2 #:hbracket #:bold "bar"
  #:override '(baseline-skip . 4)
  #:bracket #:column ("baz" "bazr" "bla"))
```

`markup->string _ #:layout layout #:props props` [Function]

Convert a markup or markup list to an approximate string representation. This is useful for, e.g., PDF metadata and MIDI markers.

The optional named *layout* and *props* argument are an output definition and a property alist chain, like the ones that are used when interpreting markups.

`markup-command-list? a` [Function]

Check whether *x* is a markup command list, i.e., a list composed of a markup list function and its arguments.

`markup-default-to-string-method a b rest ...` [Function]

The default `markup->string` handler for markups, used when `markup->string` encounters a markup that has no special `as-string` expression defined. This applies `markup->string` on all markup arguments and joins the results, separating them with spaces.

`markup-lambda ...` [Macro]

Defines and returns an anonymous markup command. Other than not registering the markup command, this is identical to `define-markup-command`.

`markup-list? a` [Function]

Return a true value if *x* is a list of markups or markup command lists.

`markup-list-lambda ...` [Macro]

Same as `markup-lambda` but defines a markup list command that, when interpreted, returns a list of stencils instead of a single one.

`measure-counter::text a` [Function]

A number for a measure count. Broken measures are numbered in parentheses. When the counter spans several measures (like with compressed multi-measure rests), it displays a measure range.

`mensural-flag a` [Function]

Mensural flags: Create the flag stencil by loading the glyph from the font. Flags are always aligned with staff lines, so we need to check the end point of the stem: For stems ending on staff lines, use different flags than for notes between staff lines. The idea is that flags are always vertically aligned with the staff lines, regardless of whether the note head is on a staff line or between two staff lines. In other words, the inner end of a flag always touches a staff line.

- `ly:message str rest` [Function]
A Scheme callable function to issue the message *str*. The message is formatted with *format*; *rest* holds the formatting arguments (if any).
- `middle-broken-spanner? a` [Function]
Is *spanner* broken and among the middle broken pieces (i.e., neither the first nor the last)?
- `midi-program a` [Function]
Return the program of the instrument.
- `ly:minimal-breaking paper-book` [Function]
Break (pages and lines) the *Paper_book* object *paper-book* without looking for optimal spacing: stack as many lines on a page before moving to the next one.
- `ly:mm num` [Function]
num mm.
- `mmrest-of-length a` [Function]
Create a multi-measure rest of exactly the same length as *mus*.
- `modern-straight-flag a` [Function]
Modern straight flag style (for composers like Stockhausen, Boulez, etc.). The angles are 18 and 22 degrees and thus smaller than for the ancient style of Bach, etc.
- `ly:module->alist mod` [Function]
Dump the contents of module *mod* as an alist.
- `ly:module-copy dest src` [Function]
Copy all bindings from module *src* into *dest*.
- `ly:modules-lookup modules sym def` [Function]
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` [Function]
Is *x* a smob of class *Moment*?
- `ly:moment<? a b` [Function]
Compare two moments.
- `ly:moment-add a b` [Function]
Add two moments.
- `ly:moment-div a b` [Function]
Divide two moments.
- `ly:moment-grace mom` [Function]
Extract grace timing as a rational number from *mom*.
- `ly:moment-grace-denominator mom` [Function]
Extract denominator from grace timing.
- `ly:moment-grace-numerator mom` [Function]
Extract numerator from grace timing.
- `ly:moment-main mom` [Function]
Extract main timing as a rational number from *mom*.

<code>ly:moment-main-denominator <i>mom</i></code>	[Function]
Extract denominator from main timing.	
<code>ly:moment-main-numerator <i>mom</i></code>	[Function]
Extract numerator from main timing.	
<code>ly:moment-mod <i>a b</i></code>	[Function]
Modulo of two moments.	
<code>ly:moment-mul <i>a b</i></code>	[Function]
Multiply two moments.	
<code>ly:moment-sub <i>a b</i></code>	[Function]
Subtract two moments.	
<code>ly:music? <i>obj</i></code>	[Function]
Is <i>obj</i> a Music object?	
<code>music->make-music <i>a</i></code>	[Function]
Generate an expression that, once evaluated, may return an object equivalent to <i>obj</i> , that is, for a music expression, a (make-music ...) form.	
<code>music-clone <i>a rest ...</i></code>	[Function]
Clone <i>music</i> and set properties according to <i>music-properties</i> , a list of alternating property symbols and values:	
(music-clone start-span 'span-direction STOP)	
Only properties that are not overridden by <i>music-properties</i> are actually fully cloned.	
<code>ly:music-compress <i>a b</i></code>	[Function]
Compress <i>mus</i> by <i>scale</i> .	
<code>ly:music-deep-copy <i>m origin</i></code>	[Function]
Copy <i>m</i> and all sub expressions of <i>m</i> . <i>m</i> may be an arbitrary type; cons cells and music are copied recursively. If <i>origin</i> is given, it is used as the origin for one level of music by calling <code>ly:set-origin!</code> on the copy.	
<code>ly:music-duration-compress <i>mus fact</i></code>	[Function]
Compress <i>mus</i> by factor <i>fact</i> , which is a Moment.	
<code>ly:music-duration-length <i>mus</i></code>	[Function]
Extract the duration field from <i>mus</i> and return the length.	
<code>music-filter <i>a b</i></code>	[Function]
Filter out music expressions that do not satisfy <i>pred?</i> .	
<code>ly:music-function? <i>x</i></code>	[Function]
Is <i>x</i> a smob of class <code>Music_function?</code>	
<code>ly:music-function-extract <i>x</i></code>	[Function]
Return the Scheme function inside <i>x</i> .	
<code>ly:music-function-signature <i>x</i></code>	[Function]
Return the function signature inside <i>x</i> .	
<code>music-is-of-type? <i>a b</i></code>	[Function]
Does <i>mus</i> belong to the music class <i>type</i> ?	

<code>ly:music-length <i>mus</i></code>	[Function]
Get the length of music expression <i>mus</i> and return it as a Moment object.	
<code>ly:music-list? <i>lst</i></code>	[Function]
Is <i>lst</i> a list of music objects?	
<code>music-map <i>a b</i></code>	[Function]
Apply <i>function</i> to <i>music</i> and all of the music it contains. First it recurses over the children, then the function is applied to <i>music</i> .	
<code>ly:music-mutable-properties <i>mus</i></code>	[Function]
Return an alist containing the mutable properties of <i>mus</i> . The immutable properties are not available, since they are constant and initialized by the make-music function.	
<code>ly:music-output? <i>x</i></code>	[Function]
Is <i>x</i> a smob of class Music_output?	
<code>music-pitches <i>a</i></code>	[Function]
Return a list of all pitches from <i>music</i> .	
<code>ly:music-property <i>mus sym val</i></code>	[Function]
Return the value for property <i>sym</i> of music expression <i>mus</i> . If no value is found, return <i>val</i> or '() if <i>val</i> is not specified.	
<code>music-selective-filter <i>a b c</i></code>	[Function]
Recursively filter out music expressions that do not satisfy <i>pred?</i> , but refrain from filtering the subexpressions of music that does not satisfy <i>descend?</i> .	
<code>music-selective-map <i>a b c</i></code>	[Function]
Apply <i>function</i> recursively to <i>music</i> , but refrain from mapping subexpressions of music that does not satisfy <i>descend?</i> .	
<code>music-separator? <i>a</i></code>	[Function]
Is <i>m</i> a separator?	
<code>ly:music-set-property! <i>mus sym val</i></code>	[Function]
Set property <i>sym</i> in music expression <i>mus</i> to <i>val</i> .	
<code>ly:music-start <i>mus</i></code>	[Function]
Get the start of music expression <i>mus</i> and return it as a Moment object.	
<code>ly:music-transpose <i>m p</i></code>	[Function]
Transpose <i>m</i> such that central C is mapped to <i>p</i> . Return <i>m</i> .	
<code>music-type-predicate <i>a</i></code>	[Function]
Return a predicate function that can be used for checking music to have one of the types listed in <i>types</i> .	
<code>neo-modern-accidental-rule <i>a b c</i></code>	[Function]
An accidental rule that typesets an accidental if it differs from the key signature <i>and</i> does not directly follow a note on the same staff line. This rule should not be used alone because it does neither look at bar lines nor different accidentals at the same note name.	
<code>no-flag <i>a</i></code>	[Function]
No flag: Simply return empty stencil.	

- `ly:non-fatal-error` *str rest* [Function]
 A Scheme callable function to issue the error *str*. The error is formatted with `format`; *rest* holds the formatting arguments (if any). When using this function, some way of signalling the error should be employed in order for the compilation to eventually result in a nonzero return code.
- `normal-flag` *a* [Function]
 Create a default flag.
- `not-first-broken-spanner?` *a* [Function]
 Is *spanner* broken *and* not the first of its broken siblings? The name is read “(not first) and broken”.
- `not-last-broken-spanner?` *a* [Function]
 Is *spanner* broken *and* not the last of its broken siblings? The name is read “(not last) and broken”.
- `ly:note-column-accidentals` *note-column* [Function]
 Return the AccidentalPlacement grob from *note-column* if any, or SCM_EOL otherwise.
- `ly:note-column-dot-column` *note-column* [Function]
 Return the DotColumn grob from *note-column* if any, or SCM_EOL otherwise.
- `ly:note-extra-source-file` *filename parser* [Function]
 Register a file, e.g., an image file, as being needed to compile the current file. This is used for the `-dembed-source-code` option. A parser may optionally be specified.
- `ly:note-head::stem-attachment` *font-metric glyph-name direction* [Function]
 Get attachment in *font-metric* for attaching a stem to notehead *glyph-name* in the direction *direction* (default UP).
- `note-name->markup` *a b* [Function]
 Return pitch markup for *pitch*, including accidentals printed as glyphs. If *lowercase?* is set to false, the note names are capitalized.
- `note-name->string` *a rest ...* [Function]
 Return pitch string for *pitch*, without accidentals or octaves. Current input language is used for pitch names, except if an other *language* is specified.
- `note-to-cluster` *a* [Function]
 Replace NoteEvents by ClusterNoteEvents.
- `ly:number->string` *s* [Function]
 Convert *s* to a string without generating many decimals.
- `number-format` *a b rest ...* [Function]
 Print *num* according to the requested *number-type*. Choices include *arabic*, *custom*, *roman-ij-lower*, *roman-ij-upper*, *roman-lower* (the default), and *roman-upper*.
 For *custom*, *custom-format* must be present; it gets applied to *num*.
- `offset-fret` *a b* [Function]
 Add *fret-offset* to each fret indication in *diagram-definition* and return the resulting verbose fret-diagram-definition.
- `offsetter` *a b* [Function]
 Apply *offsets* to the default values of *property* of *grob*. Offsets are restricted to immutable properties and values of type number, number-pair, or number-pair-list.

- `old-straight-flag` *a* [Function]
 Old straight flag style (for composers like Bach). The angles of the flags are both 45 degrees.
- `ly:one-line-auto-height-breaking` *paper-book* [Function]
 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` *paper-book* [Function]
 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` *paper-book* [Function]
 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` *paper-book* [Function]
 Optimally break (pages and lines) the `Paper_book` object *paper-book* to minimize badness for both vertical and horizontal spacing.
- `ly:option-usage` *port internal* [Function]
 Print `ly:set-option` usage. Optional *port* argument for the destination defaults to current output port. Specify *internal* to get doc for internal options.
- `ly:otf->cff` *otf-file-name idx* [Function]
 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* [Function]
 Is *font* an OpenType font?
- `ly:otf-font-glyph-info` *font glyph* [Function]
 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* [Function]
 Extract a table *tag* from *font*. Return empty string for non-existent *tag*.
- `ly:otf-glyph-count` *font* [Function]
 Return the number of glyphs in *font*.
- `ly:otf-glyph-list` *font* [Function]
 Return a list of glyph names for *font*.
- `ly:output-def?` *x* [Function]
 Is *x* a smob of class `Output_def`?
- `ly:output-def-clone` *def* [Function]
 Clone output definition *def*.
- `ly:output-def-lookup` *def sym val* [Function]
 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` *output-def default-value* [Function]
 Return the parent output definition of *output-def*, or *default-value* if *output-def* has no parent. *default-value* is optional, and defaults to `'()`.

<code>ly:output-def-scope</code> <i>def</i>	[Function]
Return the variable scope inside <i>def</i> .	
<code>ly:output-def-set-variable!</code> <i>def sym val</i>	[Function]
Set an output definition <i>def</i> variable <i>sym</i> to <i>val</i> .	
<code>ly:output-description</code> <i>output-def</i>	[Function]
Return the description of translators in <i>output-def</i> .	
<code>ly:output-find-context-def</code> <i>output-def context-name</i>	[Function]
Return an alist of all context defs (matching <i>context-name</i> if given) in <i>output-def</i> .	
<code>output-module?</code> <i>a</i>	[Function]
Return #t if <i>module</i> belongs to an output module usually carrying context definitions (<code>\midi</code> or <code>\layout</code>).	
<code>ly:outputter-close</code> <i>outputter</i>	[Function]
Close port of <i>outputter</i> .	
<code>ly:outputter-dump-stencil</code> <i>outputter stencil</i>	[Function]
Dump stencil <i>expr</i> onto <i>outputter</i> .	
<code>ly:outputter-dump-string</code> <i>outputter str</i>	[Function]
Dump <i>str</i> onto <i>outputter</i> .	
<code>ly:outputter-output-scheme</code> <i>outputter expr</i>	[Function]
Output <i>expr</i> to the paper outputter.	
<code>ly:outputter-port</code> <i>outputter</i>	[Function]
Return output port for <i>outputter</i> .	
<code>oval-stencil</code> <i>a b c d</i>	[Function]
Add an oval around <i>stencil</i> , padded by the padding pair, producing a new stencil.	
<code>override-head-style</code> <i>a b</i>	[Function]
Override style for <i>heads</i> to <i>style</i> .	
<code>override-time-signature-setting</code> <i>a b</i>	[Function]
Override the time signature settings for the context in <i>time-signature</i> , with the new setting alist <i>setting</i> .	
<code>ly:page-marker?</code> <i>x</i>	[Function]
Is <i>x</i> a smob of class <code>Page_marker?</code>	
<code>ly:page-turn-breaking</code> <i>paper-book</i>	[Function]
Optimally break (pages and lines) the <code>Paper_book</code> object <i>paper-book</i> such that page turns only happen in specified places, returning its pages.	
<code>ly:pango-font?</code> <i>f</i>	[Function]
Is <i>f</i> a Pango font?	
<code>ly:pango-font-physical-fonts</code> <i>f</i>	[Function]
Return alist of (ps-name file-name font-index) lists for Pango font <i>f</i> .	
<code>pango-pf-file-name</code> <i>a</i>	[Function]
Return the file name of the Pango physical font <i>pango-pf</i> .	

<code>pango-pf-font-name</code> <i>a</i>	[Function]
Return the font name of the Pango physical font <i>pango-pf</i> .	
<code>pango-pf-fontindex</code> <i>a</i>	[Function]
Return the font index of the Pango physical font <i>pango-pf</i> .	
<code>ly:paper-book?</code> <i>x</i>	[Function]
Is <i>x</i> a smob of class <code>Paper_book</code> ?	
<code>ly:paper-book-header</code> <i>pb</i>	[Function]
Return the header definition (<code>\header</code>) in <code>Paper_book</code> object <i>pb</i> .	
<code>ly:paper-book-pages</code> <i>pb</i>	[Function]
Return pages in <code>Paper_book</code> object <i>pb</i> .	
<code>ly:paper-book-paper</code> <i>pb</i>	[Function]
Return the paper output definition (<code>\paper</code>) in <code>Paper_book</code> object <i>pb</i> .	
<code>ly:paper-book-performances</code> <i>pb</i>	[Function]
Return performances in <code>Paper_book</code> object <i>pb</i> .	
<code>ly:paper-book-scopes</code> <i>pb</i>	[Function]
Return scopes in <code>Paper_book</code> object <i>pb</i> .	
<code>ly:paper-book-systems</code> <i>pb</i>	[Function]
Return systems in <code>Paper_book</code> object <i>pb</i> .	
<code>ly:paper-column::break-align-width</code> <i>col align-syms</i>	[Function]
<i>col</i> should be a non-musical paper-column. This function determines the horizontal extent of a break align group contained in this column, relative to the system. The break align group is searched according to <i>align-sym</i> , which is either a break align symbol (see the <code>break-align-symbol</code> property), or a list of such symbols. For example,	
<pre>(ly:paper-column::break-align-width col '(key-signature staff-bar))</pre>	
tries to find a <code>BreakAlignGroup</code> of key signatures, but falls back on bar lines if there are no key signatures or if the extent of the <code>BreakAlignGroup</code> containing them is empty (for example, if they are omitted).	
The special symbol <code>break-alignment</code> means the combined extent of all items in the paper column. It is useful as the last element of the list, for a catch-all fallback.	
This function never returns an empty interval. If no matching group is found or the group has an empty extent, it returns a point interval at the coordinate of the column relative to the system.	
<code>ly:paper-column::print</code>	[Function]
Optional stencil for <code>PaperColumn</code> or <code>NonMusicalPaperColumn</code> . Draws the <i>rank number</i> of each column, its moment in time, a blue arrow showing the ideal distance, and a red arrow showing the minimum distance between columns.	
<code>ly:paper-fonts</code> <i>def</i>	[Function]
Return a list containing the fonts from output definition <i>def</i> (e.g., <code>\paper</code>).	
<code>ly:paper-get-font</code> <i>def chain</i>	[Function]
Find a font metric in output definition <i>def</i> satisfying the font qualifiers in alist chain <i>chain</i> , and return it. (An alist chain is a list of alists, containing grob properties.)	
<code>ly:paper-get-number</code> <i>def sym</i>	[Function]
Return the value of variable <i>sym</i> in output definition <i>def</i> as a double.	

<code>ly:paper-outputscales</code> <i>def</i>	[Function]
Return the output-scale for output definition <i>def</i> .	
<code>ly:paper-score-paper-systems</code> <i>paper-score</i>	[Function]
Return vector of <code>paper_system</code> objects from <i>paper-score</i> .	
<code>ly:paper-system?</code> <i>obj</i>	[Function]
Is <i>obj</i> a C++ Prob object of type <code>paper-system</code> ?	
<code>ly:paper-system-minimum-distance</code> <i>sys1 sys2</i>	[Function]
Measure the minimum distance between two paper system Probs <i>sys1</i> and <i>sys2</i> , using their stored skylines if possible and falling back to their extents otherwise.	
<code>parenthesize-stencil</code> <i>a b c d e</i>	[Function]
Add parentheses around <i>stencil</i> , returning a new stencil.	
<code>ly:parse-file</code> <i>name</i>	[Function]
Parse a single <code>.ly</code> file. Upon failure, throw <code>ly-file-failed</code> key.	
<code>ly:parse-init</code> <i>name</i>	[Function]
Parse the init file <i>name</i> .	
<code>ly:parse-string-expression</code> <i>parser-smob ly-code filename line</i>	[Function]
Parse the string <i>ly-code</i> with <i>parser-smob</i> . Return the contained music expression. <i>filename</i> and <i>line</i> are optional source indicators.	
<code>parse-terse-string</code> <i>a</i>	[Function]
Parse a fret-diagram-terse definition string <i>terse-definition</i> and return a marking list, which can be used with a fretboard grob.	
<code>ly:parsed-undead-list!</code>	[Function]
Return the list of objects that have been found alive but should have been dead, and clear that list.	
<code>ly:parser-clear-error</code> <i>parser</i>	[Function]
Clear error flag for <i>parser</i> , defaulting to current parser.	
<code>ly:parser-clone</code> <i>closures location</i>	[Function]
Return a clone of current parser. An association list of port positions to closures can be specified in <i>closures</i> in order to have <code>\$</code> and <code>#</code> interpreted in their original lexical environment. If <i>location</i> is a valid location, it becomes the source of all music expressions inside.	
<code>ly:parser-define!</code> <i>symbol val</i>	[Function]
Bind <i>symbol</i> to <i>val</i> in current parser's module.	
<code>ly:parser-error</code> <i>msg input</i>	[Function]
Display an error message and make current parser fail. Without a current parser, trigger an ordinary error.	
<code>ly:parser-has-error?</code> <i>parser</i>	[Function]
Does <i>parser</i> (defaulting to current parser) have an error flag?	
<code>ly:parser-include-string</code> <i>ly-code</i>	[Function]
Include the string <i>ly-code</i> into the input stream for current parser. Can only be used in immediate Scheme expressions (<code>\$</code> instead of <code>#</code>).	
<code>ly:parser-lookup</code> <i>symbol</i>	[Function]
Look up <i>symbol</i> in current parser's module. Return <code>'()</code> if not defined.	

- `ly:parser-output-name parser` [Function]
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` [Function]
Parse the string *ly-code* with *parser-smob*. Upon failure, throw `ly-file-failed` key.
- `ly:parser-set-note-names names` [Function]
Replace current note names in parser. *names* is an alist of symbols. This only has effect if the current mode is notes.
- `percussion? a` [Function]
Return #t if the instrument should use MIDI channel 9.
- `ly:perform-text-replacements props input-string` [Function]
A string transformer to perform text replacements using the replacement-alist from the property alist chain *props*.
- `ly:performance-headers performance` [Function]
Return the list of headers with the innermost first.
- `ly:performance-write performance filename name` [Function]
Write *performance* to *filename* storing *name* as the name of the performance in the file metadata.
- `ly:pitch? x` [Function]
Is *x* a smob of class Pitch?
- `ly:pitch<? p1 p2` [Function]
Is *p1* lexicographically smaller than *p2*?
- `ly:pitch-alteration pp` [Function]
Extract the alteration from pitch *pp*.
- `ly:pitch-diff pitch root` [Function]
Return pitch *delta* such that *root* transposed by *delta* equals *pitch*.
- `ly:pitch-negate p` [Function]
Negate pitch *p*.
- `ly:pitch-notename pp` [Function]
Extract the note name from pitch *pp*.
- `ly:pitch-octave pp` [Function]
Extract the octave from pitch *pp*.
- `ly:pitch-quartertones pp` [Function]
Calculate the number of quarter tones of pitch *pp* from middle C.
- `ly:pitch-semitones pp` [Function]
Calculate the number of semitones of pitch *pp* from middle C.
- `ly:pitch-steps p` [Function]
Number of steps counted from middle C of the pitch *p*.
- `ly:pitch-tones pp` [Function]
Calculate the number of tones of pitch *pp* from middle C as a rational number.

- `ly:pitch-transpose` *p delta* [Function]
Transpose pitch *p* by the amount *delta*, where *delta* is relative to middle C.
- `ly:pointer-group-interface::add-grob` *grob sym grob-element* [Function]
Add *grob-element* to *grob*'s *sym* grob array.
- `polar->rectangular` *a b* [Function]
Return polar coordinates (*radius*, *angle-in-degrees*) as rectangular coordinates (x-length . y-length).
- `ly:position-on-line?` *sg spos* [Function]
Return whether *spos* is on a line of the staff associated with the grob *sg* (even on an extender line).
- `prepend-alist-chain` *a b c* [Function]
Convenience to make a new alist chain from *chain* by prepending a binding of *key* to *val*. This is similar to `acons`, for alist chains (lists of alists).
- `ly:prob?` *x* [Function]
Is *x* a smob of class Prob?
- `ly:prob-immutable-properties` *prob* [Function]
Retrieve an alist of immutable properties.
- `ly:prob-mutable-properties` *prob* [Function]
Retrieve an alist of mutable properties.
- `ly:prob-property` *prob sym val* [Function]
Return the value for property *sym* of Prob object *prob*. If no value is found, return *val* or '() if *val* is not specified.
- `ly:prob-property?` *obj sym* [Function]
Is boolean prop *sym* of *obj* set?
- `ly:prob-set-property!` *obj sym value* [Function]
Set property *sym* of *obj* to *value*.
- `ly:prob-type?` *obj type* [Function]
Is *obj* the specified prob type?
- `ly:programming-error` *str rest* [Function]
A Scheme callable function to issue the internal warning *str*. The message is formatted with `format`; *rest* holds the formatting arguments (if any).
- `ly:progress` *str rest* [Function]
A Scheme callable function to print progress *str*. The message is formatted with `format`; *rest* holds the formatting arguments (if any).
- `ly:property-lookup-stats` *sym* [Function]
Return hash table with a property access corresponding to *sym*. Choices are prob, grob, and context.
- `ly:pt` *num* [Function]
num printer points.
- `ly:pure-call` *data grob start end rest* [Function]
Convert property *data* (unpure-pure container or procedure) to value in a pure context defined by *grob*, *start*, *end*, and possibly *rest* arguments.

- `pure-chain-offset-callback` *a b c d* [Function]
 Sometimes, a chained offset callback is unpure and there is no way to write a pure function that estimates its behavior. In this case, we use a pure equivalent that will simply pass the previous calculated offset value.
- `ly:randomize-rand-seed` [Function]
 Randomize C random generator.
- `ratio->fret` *a* [Function]
 Calculate a fret number given *ratio* for the harmonic.
- `ratio->pitch` *a* [Function]
 Calculate a pitch given *ratio* for the harmonic.
- `read-lily-expression` *a b* [Function]
 Read a lilypond music expression enclosed within #{ and #} from *port* and return the corresponding Scheme music expression. '\$' and '#' introduce immediate and normal Scheme forms.
- `recording-group-emulate` *a b* [Function]
 Interpret *music* according to *odef*, but store all events in a chronological list, similar to the `Recording_group_engraver` in LilyPond version 2.8 and earlier.
- `ly:register-stencil-expression` *symbol* [Function]
 Add *symbol* as head of a stencil expression.
- `ly:register-translator` *creator name description* [Function]
 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* [Function]
 Determine the extent of *elements* relative to *common* in the *axis* direction.
- `remove-grace-property` *a b c* [Function]
 Remove all *sym* for *grob* in *context-name*.
- `remove-whitespace` *a* [Function]
 Remove characters satisfying `char-whitespace?` from string *strg*.
- `ly:rename-file` *oldname newname* [Function]
 Rename *oldname* to *newname*. In contrast to Guile's `rename-file` function, this replaces the destination if it already exists. On Windows, fall back to copying the file contents if *newname* cannot be deleted.
- `ly:reset-all-fonts` [Function]
 Forget all about previously loaded fonts.
- `retrieve-glyph-flag` *a b c d* [Function]
 Load the correct flag glyph from the font.
- `retrograde-music` *a* [Function]
 Return *music* in retrograde (reversed) order.
- `revert-fontSize` *a b* [Function]
 Used by `\magnifyMusic` and `\magnifyStaff`. Calculate the previous `fontSize` value (before scaling) by factoring out the magnification factor *mag* (if *func-name* is 'magnifyMusic), or

by factoring out the context property `magnifyStaffValue` (if *func-name* is `'magnifyStaff`). Revert the `fontSize` in the appropriate context accordingly.

With `\magnifyMusic`, the scaling is reverted after the music block it operates on. `\magnifyStaff` does not operate on a music block, so the scaling from a previous call (if there is one) is reverted before the new scaling takes effect.

`revert-head-style a` [Function]
Revert style for *heads*.

`revert-props a b c` [Function]
Used by `\magnifyMusic` and `\magnifyStaff`. Revert each prop in *props* in the appropriate context. *func-name* is either `'magnifyMusic` or `'magnifyStaff`. The *props* list is formatted like:

```
'((Stem thickness)
  (Slur line-thickness)
  ...)
```

`ly:round-filled-box xext yext blot` [Function]
Make a Stencil object that prints a black box of dimensions *xext*, *yext* and roundness *blot*.

`ly:round-polygon points blot extroversion filled-scm` [Function]
Make a Stencil object that prints a black polygon with corners at the points defined by *points* (list of coordinate pairs) and roundness *blot*. Optional *extroversion* shifts the outline outward, with the default of 0 keeping the middle of the line just on the polygon.

`rounded-box-stencil a b c d` [Function]
Add a rounded box around *stencil*, producing a new stencil.

`ly:run-translator mus output-def` [Function]
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.

`scale-beam-thickness a` [Function]
Used by `\magnifyMusic`. Scaling `Beam.beam-thickness` exactly to the *mag* value will not work. This uses two reference values for beam-thickness to determine an acceptable value when scaling, then does the equivalent of a `\temporary \override` with the new value.

`scale-fontSize a b` [Function]
Used by `\magnifyMusic` and `\magnifyStaff`. Look up the current `fontSize` in the appropriate context and scale it by the magnification factor *mag*. *func-name* is either `'magnifyMusic` or `'magnifyStaff`.

`scale-layout a b` [Function]
Return a clone of *paper*, scaled by the given scale factor.

`scale-props a b c d` [Function]
Used by `\magnifyMusic` and `\magnifyStaff`. For each prop in *props*, find the current value of the requested prop, scale it by the magnification factor *mag*, and do the equivalent of a `\temporary \override` with the new value in the appropriate context. If *allowed-to-shrink?* is `#f`, don't let the new value be less than the current value. *func-name* is either `'magnifyMusic` or `'magnifyStaff`. The *props* list is formatted like:

```
'((Stem thickness)
  (Slur line-thickness)
  ...)
```


<code>ly:score? x</code>	[Function]
Is <i>x</i> a smob of class <i>Score</i> ?	
<code>ly:score-add-output-def! score def</code>	[Function]
Add an output definition <i>def</i> to <i>score</i> .	
<code>ly:score-embedded-format score layout</code>	[Function]
Run <i>score</i> through <i>layout</i> (an output definition) scaled to correct output-scale already, returning a list of layout lines.	
<code>ly:score-error? score</code>	[Function]
Was there an error in the score?	
<code>ly:score-header score</code>	[Function]
Return score header.	
<code>ly:score-music score</code>	[Function]
Return score music.	
<code>ly:score-output-defs score</code>	[Function]
All output definitions in a score.	
<code>ly:score-set-header! score module</code>	[Function]
Set the score header.	
<code>scorify-music a</code>	[Function]
Preprocess <i>music</i> .	
<code>seconds->moment a b</code>	[Function]
Return a moment equivalent to <i>s</i> seconds at the current tempo.	
<code>select-head-glyph a b</code>	[Function]
Select a note head glyph string based on note head style <i>style</i> and duration log <i>log</i> .	
<code>self-alignment-interface::self-aligned-on-breakable a</code>	[Function]
Return the X-offset that places <i>grob</i> according to its self-alignment-X over the reference point defined by the break-align-anchor-alignment of a break-aligned item such as a Clef.	
<code>sequential-music-to-chord-exceptions a rest ...</code>	[Function]
Transform sequential music <i>seq</i> of type <code><<c d e>>-\markup{ foobar }</code> to <code>(cons cde-pitches foobar-markup)</code> , or to <code>(cons de-pitches foobar-markup)</code> if <i>omit-root</i> is given and non-false.	
<code>set-accidental-style a rest ...</code>	[Function]
Set accidental style to <i>style</i> . Optionally take a context argument, e.g., 'Staff or 'Voice. The context defaults to Staff, except for piano styles, which use GrandStaff as a context.	
<code>ly:set-color-names alist</code>	[Function]
Define named colors for <code>ly:stencil-in-color</code> . <i>alist</i> has the entries of the format <code>(name . color)</code> , where <i>color</i> is a list of length 3 (RGB) or 4 (RGB+alpha).	
<code>ly:set-default-scale scale</code>	[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.	

- `set-global-staff-size a` [Function]
Set the default staff size, where *sz* is thought to be in points.
- `ly:set-grob-creation-callback cb` [Function]
Specify a procedure that gets called every time a new grob is created. The callback receives as arguments the grob that was created, the name of the C++ source file that caused the grob to be created, and the corresponding line number in the C++ source file. Call with `#f` as argument to unset the callback.
- `ly:set-grob-modification-callback cb` [Function]
Specify a procedure that gets called every time LilyPond modifies a grob property. The callback receives 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. Call with `#f` as argument to unset the callback.
- `ly:set-middle-C! context` [Function]
Set the `middleCPosition` variable in *context* based on the variables `middleCClefPosition` and `middleCOffset`.
- `set-mus-properties! a b` [Function]
Set all of *alist* as properties of *m*.
- `ly:set-option var val` [Function]
Set a program option.
- `ly:set-origin! m origin` [Function]
Set the origin given in *origin* to *m*. *m* is typically a music expression or a list of music. List structures are searched recursively, but recursion stops at the changed music expressions themselves.
origin is generally of type `ly:input-location?`, defaulting to `(*location*)`. Other valid values for *origin* are a music expression which is then used as the source of location information, or `#f` or `'()` in which case no action is performed. The return value is *m* itself.
- `set-output-property a b c` [Function]
Usage example: `\applyoutput #(set-output-property 'Clef 'extra-offset '(0 . 1))`
- `ly:set-property-cache-callback cb` [Function]
Specify a procedure that gets called whenever LilyPond calculates a callback function and caches the result. The callback receives 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. Call with `#f` as argument to unset the callback.
- `shift-one-duration-log a b c` [Function]
Add *shift* to duration-log of 'duration in *music* and optionally *dot* to any note encountered. The number of dots in the shifted music may not be less than zero.
- `shift-right-at-line-begin a` [Function]
Shift an item to the right, but only at the start of the line.
- `shift-semitone->pitch a b` [Function]
Given a function *semitone->pitch* converting a semitone number into a note value for a lookup table created in relation to C, returns a corresponding function in relation to *key*. The note values returned by this function differ only enharmonically from the original *semitone->pitch* function.

- `skip->rest a` [Function]
 Replace *mus* by `RestEvent` of the same duration if it is a `SkipEvent`. Useful for extracting parts from crowded scores.
- `skip-of-length a` [Function]
 Create a skip of exactly the same length as *mus*.
- `skip-of-moment-span a b` [Function]
 Make skip music fitting between *start-moment* and *end-moment*. The grace part of *end-moment* matters only if *start-moment* and *end-mom* have the same main part.
- `ly:skyline? x` [Function]
 Is *x* a smob of class `Skyline`?
- `ly:skyline->points skyline horizon-axis` [Function]
 Return a list of points from the given skyline, if viewed with *horizon-axis* as ‘horizon axis’. Joining the points with a line draws the outline of the skyline.
- `ly:skyline-distance skyline other-skyline horizon-padding` [Function]
 Compute the distance between the two skylines, padding by *horizon-padding* if provided.
- `ly:skyline-empty? sky` [Function]
 Return whether skyline *sky* is empty.
- `ly:skyline-height skyline x` [Function]
 Return the height of *skyline* at point *x*.
- `ly:skyline-max-height skyline` [Function]
 Return the maximum height found in *skyline*.
- `ly:skyline-max-height-position skyline` [Function]
 Return the position at which *skyline* reaches its maximum height.
- `ly:skyline-merge skyline1 skyline2` [Function]
 Merge the two given skylines.
- `ly:skyline-pad skyline horizon-padding` [Function]
 Return a version of *skyline* padded by *horizon-padding* along the horizon.
- `ly:skyline-touching-point skyline other-skyline horizon-padding` [Function]
 Get the point where *skyline* and *other-skyline* (having opposite directions) reach their minimum distance. If *horizon-padding* is provided, one skyline is padded with it first.
- `ly:skylines-for-stencil stencil axis` [Function]
 Return a pair of skylines representing the outline of *stencil*. *axis* is the ‘horizon axis’ (i.e., this function gives skylines suitable for the `vertical-skylines` property if *axis* is `X`, and for `horizontal-skylines` if *axis* is `Y`).
- `ly:smob-protects` [Function]
 Return LilyPond’s internal smob protection list.
- `ly:solve-spring-rod-problem springs rods length ragged` [Function]
 Solve a spring and rod problem for *count* objects that are connected by *count*-1 *springs*, and an arbitrary number of *rods*. *count* is implicitly given by *springs* and *rods*. The *springs* argument has the format (*ideal*, *inverse_hook*) and *rods* is of the form (*idx1*, *idx2*, *distance*).
length is a number, *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? *x* [Function]
Is *x* a smob of class *Source_file*?
- ly:source-files *parser-smob* [Function]
Return a list of input files that have been opened up to here, including the files that have been closed already. A parser, *parser-smob*, may optionally be specified.
- ly:span-bar::before-line-breaking *a* [Function]
A dummy callback that kills the Grob *grob* if it contains no elements.
- ly:span-bar::calc-anchor *a* [Function]
Calculate the anchor position of the SpanBar. The anchor is used for the correct placement of bar numbers, etc.
- ly:span-bar::calc-glyph-name *a* [Function]
Return the 'glyph-name of the corresponding BarLine grob. The corresponding SpanBar glyph is computed within span-bar::compound-bar-line.
- span-bar::compound-bar-line *a b c* [Function]
Build the stencil of the span bar.
- ly:span-bar::print *a* [Function]
The print routine for span bars.
- ly:span-bar::width *a* [Function]
Compute the width of the SpanBar stencil.
- Span_stem_engraver *a* [Function]
Connect cross-staff stems to the stems above in the system.
- ly:spanner? *g* [Function]
Is *g* a spanner object?
- ly:spanner-bound *spanner dir def* [Function]
Get one of the bounds of *spanner*. *dir* is -1 for left, and 1 for right. If the spanner does not (yet) have a bound for this direction, return *def*, or '() if *def* is not specified.
- ly:spanner-broken-into *spanner* [Function]
Return broken-into list for *spanner*.
- ly:spanner-set-bound! *spanner dir item* [Function]
Set grob *item* as bound in direction *dir* for *spanner*.
- ly:spawn *command rest* [Function]
Simple Scheme interface to the GLib function *g_spawn_sync*. If an error occurs, format it with *format* and *rest*.
- split-list-by-separator *a b* [Function]
Split *lst* at each element that satisfies *pred*, and return the parts (with the separators removed) as a list of lists. Example:
(split-list-by-separator '(a 0 b c 1 d) number?)
⇒ ((a) (b c) (d))

<code>ly:spring? x</code>	[Function]
Is <i>x</i> a smob of class <i>Spring</i> ?	
<code>ly:spring-set-inverse-compress-strength! spring strength</code>	[Function]
Set the inverse compress <i>strength</i> of <i>spring</i> .	
<code>ly:spring-set-inverse-stretch-strength! spring strength</code>	[Function]
Set the inverse stretch <i>strength</i> of <i>spring</i> .	
<code>stack-lines a b c d</code>	[Function]
Stack stencils vertically with a baseline skip.	
<code>stack-stencil-line a b</code>	[Function]
Adjoin a list of <i>stencils</i> along the x axis, leaving <i>space</i> between the end of each stencil and the beginning of the following stencil. Stencils with empty y extent are not given <i>space</i> before them and don't avoid overlapping other stencils.	
<code>stack-stencils a b c d</code>	[Function]
Stack stencils <i>stils</i> in direction <i>axis</i> , <i>dir</i> , using <i>padding</i> .	
<code>stack-stencils-padding-list a b c d</code>	[Function]
Stack stencils <i>stils</i> in direction <i>axis</i> , <i>dir</i> , using a list of <i>paddings</i> .	
<code>staff-ellipsis::calc-y-extent a</code>	[Function]
Callback for <i>StaffEllipsis</i> grob, which is used with <i>skipTypesetting</i> .	
<code>staff-ellipsis::print a</code>	[Function]
Callback for <i>StaffEllipsis</i> grob, which is used with <i>skipTypesetting</i> .	
<code>ly:staff-symbol-line-thickness grob</code>	[Function]
Return the current staff line thickness in the staff associated with <i>grob</i> , expressed as a multiple of the current staff space height.	
<code>ly:staff-symbol-staff-radius grob</code>	[Function]
Return the radius of the staff associated with <i>grob</i> .	
<code>ly:staff-symbol-staff-space grob</code>	[Function]
Return the current staff space height in the staff associated with <i>grob</i> , expressed as a multiple of the default height of a staff space in the traditional five-line staff.	
<code>ly:stderr-redirect fd-or-file-name mode</code>	[Function]
Redirect standard error output (<i>stderr</i>) to file descriptor <i>fd</i> if the first parameter is an integer, or to file <i>file-name</i> , opened with <i>mode</i> .	
<code>ly:stencil? x</code>	[Function]
Is <i>x</i> a smob of class <i>Stencil</i> ?	
<code>ly:stencil-add args</code>	[Function]
Combine stencils. Takes any number of arguments.	
<code>ly:stencil-aligned-to stil axis dir</code>	[Function]
Align stencil <i>stil</i> using its own extents. <i>dir</i> is a number. -1 and 1 are left and right, respectively. Other values are interpolated (so 0 means the center).	
<code>ly:stencil-combine-at-edge first axis direction second padding</code>	[Function]
Construct a stencil by putting <i>second</i> next to <i>first</i> . <i>axis</i> can be 0 (x axis) or 1 (y axis). <i>direction</i> can be -1 (left or down) or 1 (right or up). The stencils are juxtaposed with <i>padding</i> as extra space. <i>first</i> and <i>second</i> may also be ' () or #f.	

- `ly:stencil-empty? stil axis` [Function]
Return whether *stil* is empty. If an optional *axis* is supplied, the emptiness check is restricted to that axis.
- `ly:stencil-expr stil` [Function]
Return the expression of stencil *stil*.
- `ly:stencil-extent stil axis` [Function]
Return a pair of numbers signifying the extent of stencil *stil* in *axis* direction (0 or 1 for x and y axis, respectively).
- `ly:stencil-in-color stc r g b a` [Function]
Put stencil *stc* in a different color. Accepts either three values for *r*, *g*, *b* and an optional value for *a*, or a single CSS-like string.
- `ly:stencil-outline stil outline` [Function]
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` [Function]
Return a stencil *stil* rotated by *angle* degrees around the relative offset (*x*, *y*). E.g., an offset of (-1, 1) rotates the stencil around the left upper corner.
- `ly:stencil-rotate-absolute stil angle x y` [Function]
Return a stencil *stil* rotated by *angle* degrees around point (*x*, *y*), given in absolute coordinates.
- `ly:stencil-scale stil x y` [Function]
Scale stencil *stil* using the horizontal and vertical scaling factors *x* and optional *y* (defaulting to *x*). Negative values 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` [Function]
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` [Function]
Return a copy of stencil *stil* but translated by *offset* (a pair of numbers).
- `ly:stencil-translate-axis stil amount axis` [Function]
Return a copy of stencil *stil* but translated by *amount* in *axis* direction.
- `stencil-true-extent a b` [Function]
Return the extent of the actual printed ink of *stencil* on *axis*.
- `stencil-whiteout - [- [-]]` [Function]
White-out a stencil (i.e., add a white background around it).
style, *thickness* and *line-thickness* are optional arguments. If set, *style* determines the shape of the white background. Given 'outline the white background is produced by `stencil-whiteout-outline`, given 'rounded-box it is produced by `stencil-whiteout-box`

with rounded corners, given other arguments (e.g., 'box) or when unspecified it defaults to stencil-whiteout-box with square corners. If *thickness* is specified it determines how far, as a multiple of *line-thickness*, the white background extends past the extents of stencil *stil*. If *thickness* has not been specified, an appropriate default is chosen based on *style*.

stencil-whiteout-box - [- [- [-]]] [Function]

White-out a stencil by printing it on top of a white (or *color*) rectangle.

thickness is how far, as a multiple of line-thickness, the white outline extends past the extents of stencil *stil*.

stencil-whiteout-outline - [- [- [- [-]]] [Function]

White-out a stencil by surrounding it with white (or *color*) around its outline.

This function works by creating a series of white or *color* stencils radially offset from the original stencil with angles from 0 to 2π , at an increment of *angle-inc*, and with radii from *radial-inc* to *thickness*. *thickness* is how big the white outline is, as a multiple of line-thickness. *radial-increments* is how many copies of the white stencil we make on our way out to thickness. *angle-increments* is how many copies of the white stencil we make between 0 and 2π .

straight-flag a b c d e f [Function]

Create a stencil for a straight flag. *flag-thickness* and *flag-spacing* are given in staff spaces, *upflag-angle* and *downflag-angle* are given in degrees, and *upflag-length* and *downflag-length* are given in staff spaces.

All lengths are scaled according to the font size of the note.

ly:stream-event? obj [Function]

Is *obj* a Stream_event object?

ly:string-percent-encode str [Function]

Encode all characters in string *str* with hexadecimal percent escape sequences, with the following exceptions: characters '-./_' and characters in ranges 0-9, A-Z, and a-z.

ly:string-substitute a b s [Function]

Replace string *a* by string *b* in string *s*.

style-note-heads a b c [Function]

Set *style* for all *heads* in *music*. Works both inside of and outside of chord construct.

suggest-convert-ly-message a [Function]

Internally used when the file has an error, to suggest usage of convert-ly if the \version statement is considered outdated compared to the LilyPond version that is running.

symbol-concatenate rest ... [Function]

Like string-concatenate, but for symbols.

ly:system-font-load name [Function]

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.

tag-group-get a [Function]

Return the tag group (as a list of symbols) that the given *tag* symbol belongs to, #f if none.

- `tags-keep-predicate a` [Function]
Return a predicate that returns #f for any music that is to be removed by `\keepWithTag` on the given symbol or list of symbols *tags*.
- `tags-remove-predicate a` [Function]
Return a predicate that returns #f for any music that is to be removed by `\removeWithTag` on the given symbol or list of symbols *tags*.
- `teaching-accidental-rule a b c` [Function]
An accidental rule that typesets a cautionary accidental if it is included in the key signature *and* does not directly follow a note on the same staff line.
- `ly:text-interface::interpret-markup` [Function]
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:time-signature::print a` [Function]
Print routine for time signatures.
- `ly:transform? x` [Function]
Is *x* a smob of class Transform?
- `ly:transform->list transform` [Function]
Convert a transform matrix to a list of six values. Values are *xx*, *yx*, *xy*, *yy*, *x0*, *y0*.
- `ly:translate-cpp-warning-scheme str` [Function]
Translate a string in C++ printf format and modify it to use it for Scheme formatting.
- `ly:translator? x` [Function]
Is *x* a smob of class Translator?
- `ly:translator-context trans` [Function]
Return the context of the translator object *trans*.
- `ly:translator-description creator` [Function]
Return an alist of properties of translator definition *creator*.
- `ly:translator-group? x` [Function]
Is *x* a smob of class Translator_group?
- `ly:translator-name creator` [Function]
Return the type name of the translator definition *creator*. The name is a symbol.
- `ly:transpose-key-alist l pit` [Function]
Make a new key alist of *l* transposed by pitch *pit*.
- `ly:ttf->pfa ttf-file-name idx` [Function]
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` [Function]
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` [Function]
 Convert the contents of a Type 1 font in PFB format to PFA format. If the file is already in PFA format, pass it through.
- `unbroken-or-first-broken-spanner? a` [Function]
 Is *spanner* either unbroken or the first of its broken siblings?
- `unbroken-or-last-broken-spanner? a` [Function]
 Is *spanner* either unbroken or the last of its broken siblings?
- `unbroken-spanner? a` [Function]
 Is *spanner* unbroken? A spanner has to be broken if it spans more than one system, or if one of its bounds is on the limit of the system. This function returns #f on the clones, but #t on the originals.
- `unfold-repeats a b` [Function]
 Replace repeats of the types given by *types* with unfolded repeats. If *types* is an empty list, repeated-music is taken, unfolding all.
- `unfold-repeats-fully a` [Function]
 Unfold repeats and expand the resulting unfolded-repeated-music.
- `uniq-list a` [Function]
 Remove doublets from list *lst* (i.e., make its elements unique), assuming that it is sorted. Uses equal? for comparisons.
- `ly:unit` [Function]
 Return the unit used for lengths as a string.
- `unity-if-multimeasure a b` [Function]
 Given a context and a duration, return 1 if the duration is longer than the measureLength in that context, and #f otherwise. This supports historic use of Completion_heads_engraver to split c1*3 into three whole notes.
- `ly:unpure-call data grob rest` [Function]
 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` [Function]
 Is *x* a smob of class Unpure_pure_container?
- `ly:unpure-pure-container-pure-part pc` [Function]
 Return the pure part of *pc*.
- `ly:unpure-pure-container-unpure-part pc` [Function]
 Return the unpure part of *pc*.
- `ly:usage` [Function]
 Print usage message.
- `value-for-spanner-piece a b` [Function]
 Associate a piece of broken spanner *grob* with an element of list *arg*.
- `ly:verbose-output?` [Function]
 Was verbose output requested, i.e., is the log level at least DEBUG?
- `ly:version` [Function]
 Return the current LilyPond version as a list, e.g., (1 3 127 uu1).

- `ly:version? a b` [Function]
Use operator *op* to compare the currently executed LilyPond version with a given version *ver*, which is passed as a list of numbers.
- `voicify-music _ [-]` [Function]
Recursively split chords that are separated with `\\`. Optional *id* can be a list of context ids to use. If numeric, they also indicate a voice type override. If *id* is just a single number, that's where numbering starts.
- `volta-bracket::calc-hook-visibility a` [Function]
Determine the visibility of the volta bracket end hook, returning `#t` if *no* hook should be drawn.
- `ly:volta-bracket::calc-shorten-pair a` [Function]
Calculate the shorten-pair values for an ideal placement of the volta brackets relative to the bar lines.
- `volta-spec-music a b` [Function]
Add `\volta number-list` to *music*.
- `ly:warning str rest` [Function]
A Scheme callable function to issue the warning *str*. The message is formatted with *format*; *rest* holds the formatting arguments (if any).
- `ly:warning-located location str rest` [Function]
A Scheme callable function to issue the warning *str* at the specified location in an input file. The message is formatted with *format*; *rest* holds the formatting arguments (if any).
- `ly:wide-char->utf-8 wc` [Function]
Encode the Unicode codepoint *wc*, an integer, as UTF-8.
- `write-me a b` [Function]
Return *x*. Display *message* and write *x*. Handy for debugging, possibly turned off.

Appendix A Indices

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(Index is nonexistent)

A.2 Function index

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