This manual is a technical reference for all internal elements used by LilyPond version 2.25.17 and all Scheme functions it provides. This information can be used to create tweaks and extensions, from simple output settings to advanced Scheme programming.

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 2.25.17
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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 49), dynamic-event (page 52), music-event (page 55), and StreamEvent (page 58).

Accepted by: Dynamic_engraver (page 464), and Dynamic_performer (page 464).

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 49), music-event (page 55), and StreamEvent (page 58).

Accepted by: Bar_engraver (page 447), and Jump_engraver (page 472).

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 50), mark-event (page 54), music-event (page 55), and StreamEvent (page 58).
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Accepted by: Mark_tracking_translator (page 477).

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 50), music-event (page 55), StreamEvent (page 58), and structural-event (page 59).

Accepted by: Timing_translator (page 498).

Properties:

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

types (list):
 '(alternative-event structural-event 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 50), music-event (page 55), and StreamEvent (page 58).

Accepted by: Balloon_engraver (page 447).

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 50), layout-instruction-event (page 53),
music-event (page 55), and StreamEvent (page 58).
Accepted by: Output_property_engraver (page 483).
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 50), music-event (page 55), and StreamEvent (page 58).
Accepted by: Arpeggio_engraver (page 446).
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 50), music-event (page 55), script-event (page 57), and StreamEvent (page 58).

Accepted by: Beat_engraver (page 452), Beat_performer (page 452), Drum_note_performer (page 462), Note_performer (page 483), and Script_engraver (page 489).

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 BarCheckEvent

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

Event classes: bar-check-event (page 50), music-event (page 55), and StreamEvent (page 58).

Accepted by: Timing_translator (page 498).

Properties:

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

types (list):
 '(bar-check-event event)
 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 50), music-event (page 55), and StreamEvent (page 58).

Accepted by: Timing_translator (page 498).

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 50), `music-event` (page 55), `rhythmic-event` (page 57), and `StreamEvent` (page 58).
- Accepted by: `Figured_bass_engraver` (page 465).
- 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 50), `music-event` (page 55), `span-event` (page 58), and `StreamEvent` (page 58).
- Accepted by: `Beam_engraver` (page 451), `Beam_performer` (page 452), and `Grace_beam_engraver` (page 469).
- 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 51), `music-event` (page 55), and `StreamEvent` (page 58).
- Accepted by: `Auto_beam_engraver` (page 446), and `Grace_auto_beam_engraver` (page 468).
- 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 51), `music-event` (page 55), and `StreamEvent` (page 58).
- Accepted by: `Bend_engraver` (page 453).
- Properties:
  - `name (symbol)`: `BendAfterEvent`
  - `types (list)`: `'(post-event bend-after-event event)`

1.1.16 **BendSpanEvent**
Used to signal where a bend spanner starts and stops.

- Event classes: `bend-span-event` (page 51), `music-event` (page 55), `span-event` (page 58), and `StreamEvent` (page 58).
- Accepted by: `Bend_spanner_engraver` (page 453).
- Properties:
  - `name (symbol)`: `BendSpanEvent`
  - `types (list)`: `'(bend-span-event post-event span-event event)`

1.1.17 **BreakDynamicSpanEvent**
End an alignment spanner for dynamics here.

- Event classes: `break-dynamic-span-event` (page 51), `break-span-event` (page 51), `music-event` (page 55), and `StreamEvent` (page 58).
- Accepted by: `Dynamic_engraver` (page 464).
- Properties:
  - `name (symbol)`: `BreakDynamicSpanEvent`
  - `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 51), music-event (page 55), and StreamEvent (page 58).

Accepted by: Breathing_sign_engraver (page 454), and Note_performer (page 483).

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 51), music-event (page 55), and StreamEvent (page 58).

Accepted by: Bar_engraver (page 447), Caesura_engraver (page 454), and Divisio_engraver (page 461).

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 51), melodic-event (page 54), music-event (page 55), rhythmic-event (page 57), and StreamEvent (page 58).

Accepted by: Cluster_spanner_engraver (page 457).

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 51), music-event (page 55), StreamEvent (page 58), and structural-event (page 59).
  Accepted by: Bar_engraver (page 447), and Mark_tracking_translator (page 477).

Properties:
  name (symbol):
    'CodaMarkEvent
    Name of this music object.
  types (list):
    '(coda-mark-event structural-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 52), music-event (page 55), and StreamEvent (page 58).
  Accepted by: Extender_engraver (page 465).

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 52), music-event (page 55), span-dynamic-event (page 58), span-event (page 58), and StreamEvent (page 58).

Accepted by: Dynamic_ engraver (page 464), and Dynamic_performer (page 464).

Properties:

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

types (list):
   '(post-event
       span-event
       span-dynamic-event
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1.1.26 DalSegnoEvent
Add a D.S. or similar instruction.

Event classes: dal-segno-event (page 52), music-event (page 55), StreamEvent (page 58), and structural-event (page 59).

Accepted by: Bar_engraver (page 447), Jump_engraver (page 472), and Volta_engraver (page 501).

Properties:

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

types (list):
'(dal-segno-event structural-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 52), music-event (page 55), span-dynamic-event (page 58), span-event (page 58), and StreamEvent (page 58).

Accepted by: Dynamic_engraver (page 464), and Dynamic_performer (page 464).

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 52), music-event (page 55), rhythmic-event (page 57), and StreamEvent (page 58).

Accepted by: Double_percent_repeat_engraver (page 462).
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 52), music-event (page 55), and StreamEvent (page 58).

Accepted by: Duration_line_engraver (page 463).

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 52), music-event (page 55), span-event (page 58), and StreamEvent (page 58).

Accepted by: Episema_engraver (page 465).

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 52), music-event (page 55), and StreamEvent (page 58).

Accepted by: Extender_engraver (page 465).

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 52), music-event (page 55), StreamEvent (page 58), and structural-event (page 59).

Accepted by: Bar_engraver (page 447), Divisio_engraver (page 461), Jump_engraver (page 472), Timing_translator (page 498), and Volta_engraver (page 501).

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 53), music-event (page 55), span-event (page 58), and StreamEvent (page 58).

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 53), music-event (page 55), and StreamEvent (page 58).

Accepted by: Fingering_engraver (page 466), Fretboard_engraver (page 467), and Tab_note_heads_engraver (page 495).

Properties:

name (symbol):
  'FingeringEvent
  Name of this music object.
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1.1.37 FootnoteEvent
Footnote a grob.

Event classes: footnote-event (page 53), music-event (page 55), and StreamEvent (page 58).
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 53), music-event (page 55), and StreamEvent (page 58).
Accepted by: Glissando_ engraver (page 468).
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 53), music-event (page 55), and StreamEvent
  (page 58).
  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 53), music-event (page 55), and StreamEvent
  (page 58).
  Accepted by: Hyphen_engraver (page 471).
  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 InitialContextMusic
Enter the initial context of the argument and ignore the rest of it.
  Syntax: \initialContextFrom music
  Properties:
    iterator-ctor (procedure):
      ly:initial-context-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):
    'InitialContextMusic

Name of this music object.

to-relative-callback (procedure):
    ly:relative-octave-music::no-relative-callback

How to transform a piece of music to relative pitches.

types (list):
    '(initial-context-music)

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

1.1.43 KeyChangeEvent

Change the key signature.

Syntax: \key name scale

Event classes: key-change-event (page 53), music-event (page 55), and StreamEvent (page 58).

Accepted by: Key_engraver (page 473), and Key_performer (page 474).

Properties:

name (symbol):
    'KeyChangeEvent

Name of this music object.

to-relative-callback (procedure):
    #<procedure at lily/define-music-types.scm:337:33 (x p)>

How to transform a piece of music to relative pitches.

types (list):
    '(key-change-event event)

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

1.1.44 LabelEvent

Place a bookmarking label.

Event classes: label-event (page 53), music-event (page 55), and StreamEvent (page 58).

Accepted by: Paper_column_engraver (page 484).

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.

1.1.45 LaissezVibrerEvent
Don’t damp this chord.
  Syntax: note\laissezVibrer
  Event classes: laissez-vibrer-event (page 53), music-event (page 55), and StreamEvent (page 58).
  Accepted by: Laissez_vibrer_engraver (page 475).
  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.

1.1.46 LigatureEvent
Start or end a ligature.
  Event classes: ligature-event (page 54), music-event (page 55), span-event (page 58), and StreamEvent (page 58).
  Accepted by: Kievan_ligature_engraver (page 474), Ligature_bracket_engraver (page 475), Mensural_ligature_engraver (page 479), and Vaticana_ligature_engraver (page 500).
  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.

1.1.47 LineBreakEvent
Allow, forbid or force a line break.
  Event classes: break-event (page 51), line-break-event (page 54), music-event (page 55), and StreamEvent (page 58).
  Accepted by: Page_turn_engraver (page 484), and Paper_column_engraver (page 484).
  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.

### 1.1.48 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.

### 1.1.49 LyricEvent

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

**Event classes:** lyric-event (page 54), music-event (page 55), rhythmic-event (page 57), and StreamEvent (page 58).

**Accepted by:** Lyric_engraver (page 475), and Lyric_performer (page 475).

**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.
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1.1.50 MeasureCounterEvent

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

Event classes: measure-counter-event (page 54), music-event (page 55), span-event (page 58), and StreamEvent (page 58).

Accepted by: Measure_counter_engraver (page 478).

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.

1.1.51 MeasureSpannerEvent

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

Event classes: measure-spanner-event (page 54), music-event (page 55), span-event (page 58), and StreamEvent (page 58).

Accepted by: Measure_spanner_engraver (page 478).

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.

1.1.52 MultiMeasureArticulationEvent

Articulations on multi-measure rests.

Event classes: multi-measure-articulation-event (page 54), music-event (page 55), and StreamEvent (page 58).

Accepted by: Multi_measure_rest_engraver (page 480).

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.
1.1.53 MultiMeasureRestEvent

Used internally by MultiMeasureRestMusic to signal rests.

Event classes: general-rest-event (page 53), multi-measure-rest-event (page 54),
music-event (page 55), rhythmic-event (page 57), and StreamEvent (page 58).

Accepted by: Current_chord_text_engraver (page 460), and
Multi_measure_rest_engraver (page 480).

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.

1.1.54 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 param-
  eter.

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.

1.1.55 MultiMeasureTextEvent

Texts on multi-measure rests.

Syntax: R~\markup { "bla" }

Event classes: multi-measure-text-event (page 54), music-event (page 55), and
StreamEvent (page 58).

Accepted by: Multi_measure_rest_engraver (page 480).
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.

1.1.56 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.

1.1.57 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 54), music-event (page 55), note-event (page 55), rhythmic-event (page 57), and StreamEvent (page 58).

Accepted by: Beat_engraver (page 452), Beat_performer (page 452), Bend_spanner_engraver (page 453), Completion_heads_engraver (page 457), Current_chord_text_engraver (page 460), Drum_note_performer (page 462), Drum_notes_engraver (page 462), Finger_glide_engraver (page 466), Fretboard_engraver (page 467), Note_heads_engraver (page 482), Note_name_engraver (page 482), Note_performer (page 483), Part_combine_engraver (page 485), Phrasing_slur_engraver (page 485), Slur_engraver (page 491), and Tab_note_heads_engraver (page 495).

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.
1.1.58 NoteGroupingEvent
Start or stop grouping brackets.

Event classes: music-event (page 55), note-grouping-event (page 55), and StreamEvent (page 58).

Accepted by: Horizontal_bracket_engraver (page 471).

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.

1.1.59 OttavaEvent
Start or stop an ottava bracket.

Event classes: music-event (page 55), ottava-event (page 55), and StreamEvent (page 58).

Accepted by: Ottava_spanner_engraver (page 483).

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.

1.1.60 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.
1.1.61 **PageBreakEvent**

Allow, forbid or force a page break.

Event classes: break-event (page 51), music-event (page 55), page-break-event (page 56), and StreamEvent (page 58).

Accepted by: Page_turn_engraver (page 484), and Paper_column_engraver (page 484).

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.

1.1.62 **PageTurnEvent**

Allow, forbid or force a page turn.

Event classes: break-event (page 51), music-event (page 55), page-turn-event (page 56), and StreamEvent (page 58).

Accepted by: Page_turn_engraver (page 484), and Paper_column_engraver (page 484).

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.

1.1.63 **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.
1.1.64 PartialEvent

An event announcing a partial measure.

Event classes: music-event (page 55), partial-event (page 56), and StreamEvent (page 58).

Accepted by: Timing_translator (page 498).

Properties:

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

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

1.1.65 PartialSet

Create an anacrusis or upbeat (partial measure).

Properties:

elements-callback (procedure):
  make-partial-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: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.

1.1.66 PercentEvent

Used internally to signal percent repeats.

Event classes: music-event (page 55), percent-event (page 56), and StreamEvent (page 58).
Accepted by: Percent_repeat_engraver (page 485).

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.

### 1.1.67 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.

### 1.1.68 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 55), pes-or-flexa-event (page 56), and StreamEvent (page 58).

Accepted by: Vaticana_ligature_engraver (page 500).

Properties:

- **name (symbol):**
  'PesOrFlexaEvent
  Name of this music object.
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1.1.69 PhrasingSlurEvent
Start or end phrasing slur.

Syntax: note\( (\text{and} \text{note})\)

Event classes: music-event (page 55), phrasing-slur-event (page 56), span-event (page 58), and StreamEvent (page 58).

Accepted by: Phrasing_slur_engraver (page 485).

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.

1.1.70 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.

1.1.71 PropertySet
Set a context property.

Syntax: \set context.prop = scheme-val

Properties:

iterator-ctor (procedure):
   1y:property-iterator::constructor
   Function to construct a music-event-iterator object for this music.

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

1.1.72 PropertyUnset
Restore the default setting for a context property. See Section 1.1.71 [PropertySet], page 26.

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.

1.1.73 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.
1.1.74 **RehearsalMarkEvent**

Insert a rehearsal mark.

- **Syntax:** `\mark marker`
- **Example:** `\mark 3`

Event classes: `mark-event` (page 54), `music-event` (page 55), `rehearsal-mark-event` (page 56), and `StreamEvent` (page 58).

Accepted by: `Mark_tracking_translator` (page 477).

**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.

1.1.75 **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.

1.1.76 **RelativeOctaveMusic**

Music in which the assignment of octaves is complete.

**Properties:**

- **iterator-ctor (procedure):**
  
  `ly:音乐-event-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.

1.1.77 RepeatSlashEvent
Used internally to signal beat repeats.
  Event classes: music-event (page 55), repeat-slash-event (page 56), rhythmic-event (page 57), and StreamEvent (page 58).
  Accepted by: Slash_repeat_engraver (page 490).
  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.

1.1.78 RepeatTieEvent
Ties for starting a second volta bracket.
  Event classes: music-event (page 55), repeat-tie-event (page 56), and StreamEvent (page 58).
  Accepted by: Repeat_tie_engraver (page 488).
  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.

1.1.79 RestEvent
A Rest.
  Syntax: r4 for a quarter rest.
  Event classes: general-rest-event (page 53), music-event (page 55), rest-event (page 57), rhythmic-event (page 57), and StreamEvent (page 58).
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Accepted by: Completion_rest_engraver (page 458), Current_chord_text_engraver (page 460), Figured_bass_engraver (page 465), and Rest_engraver (page 488).

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

1.1.80 RevertProperty
The opposite of Section 1.1.60 [OverrideProperty], page 22: 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.

1.1.81 ScriptEvent
Add an articulation mark to a note.

  Event classes: music-event (page 55), script-event (page 57), and StreamEvent (page 58).

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

Event classes: music-event (page 55), section-event (page 57), StreamEvent (page 58), and structural-event (page 59).

Accepted by: Bar_engraver (page 447), and Divisio_engraver (page 461).

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.

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

Event classes: music-event (page 55), section-label-event (page 57), and StreamEvent (page 58).

Accepted by: Mark_tracking_translator (page 477).

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.

1.1.84 SegnoMarkEvent
Add a segno mark or bar line.

Event classes: music-event (page 55), segno-mark-event (page 57), StreamEvent (page 58), and structural-event (page 59).

Accepted by: Bar_engraver (page 447), and Mark_tracking_translator (page 477).

Properties:

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

types (list):
  '(segno-mark-event structural-event event)
  The types of this music object; determines by what engraver this music expression is processed.
1.1.85 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.

1.1.86 SequentialAlternativeMusic

Repeat alternatives in sequence.

Syntax: `\alternative { alternatives }`

Properties:

- **elements-callback (procedure):**
  
  `<procedure at lily/define-music-types.scm:636:30 (m)>`

  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.

1.1.87 SequentialMusic
Music expressions concatenated.

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

   Properties:

   elements-callback (procedure):
     #<procedure at lily/define-music-types.scm:649:30 (m)>
     Return a list of children, for use by a sequential iterator. Takes a single music param-
     eter.

   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.

1.1.88 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.

1.1.89 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 55), rhythmic-event (page 57), skip-event (page 57),
   and StreamEvent (page 58).
   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.

1.1.90 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.

### 1.1.91 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.

### 1.1.92 SlurEvent
Start or end slur.

**Syntax:** note( and note)

**Event classes:** music-event (page 55), slur-event (page 57), span-event (page 58), and StreamEvent (page 58).

**Accepted by:** Slur_engraver (page 491), and Slur_performer (page 491).

**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.
1.1.93 SoloOneEvent

Print ‘Solo 1’.

Event classes: music-event (page 55), part-combine-event (page 56), solo-one-event (page 57), and StreamEvent (page 58).

Accepted by: Part_combine_ engraver (page 485).

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.

1.1.94 SoloTwoEvent

Print ‘Solo 2’.

Event classes: music-event (page 55), part-combine-event (page 56), solo-two-event (page 57), and StreamEvent (page 58).

Accepted by: Part_combine_ engraver (page 485).

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.

1.1.95 SostenutoEvent

Depress or release sostenuto pedal.

Event classes: music-event (page 55), pedal-event (page 56), sostenuto-event (page 58), span-event (page 58), and StreamEvent (page 58).

Accepted by: Piano_pedal_ engraver (page 486), and Piano_pedal_performer (page 487).

Properties:

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

Start a new spacing section.

Event classes: music-event (page 55), spacing-section-event (page 58), and StreamEvent (page 58).

Accepted by: Spacing_engraver (page 491).

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.

1.1.97 SpanEvent

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

Event classes: music-event (page 55), span-event (page 58), and StreamEvent (page 58).

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.

1.1.98 StaffHighlightEvent

Start or stop a staff highlight.

Syntax: \staffHighlight, \stopStaffHighlight.

Event classes: music-event (page 55), span-event (page 58), staff-highlight-event (page 58), and StreamEvent (page 58).

Accepted by: Staff_highlight_engraver (page 493).

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.
1.1.99 **StaffSpanEvent**
Start or stop a staff symbol.

Event classes: music-event (page 55), span-event (page 58), staff-span-event (page 58), and StreamEvent (page 58).

Accepted by: Staff_symbol_engraver (page 493).

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.

1.1.100 **StringNumberEvent**
Specify on which string to play this note.

Syntax: 

Event classes: music-event (page 55), StreamEvent (page 58), and string-number-event (page 59).

Accepted by: Bend_spanner_engraver (page 453), Fretboard_engraver (page 467), and Tab_note_heads_engraver (page 495).

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.

1.1.101 **StrokeFingerEvent**
Specify with which finger to pluck a string.

Syntax: \rightHandFinger text

Event classes: music-event (page 55), StreamEvent (page 58), and stroke-finger-event (page 59).

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.
1.1.102 **SustainEvent**

Depress or release sustain pedal.

Event classes: `music-event` (page 55), `pedal-event` (page 56), `span-event` (page 58), `StreamEvent` (page 58), and `sustain-event` (page 59).

Accepted by: `Piano_pedal_engraver` (page 486), and `Piano_pedal_performer` (page 487).

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.

1.1.103 **TempoChangeEvent**

A metronome mark or tempo indication.

Event classes: `music-event` (page 55), `StreamEvent` (page 58), and `tempo-change-event` (page 59).

Accepted by: `Metronome_mark_engraver` (page 479).

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.

1.1.104 **TextMarkEvent**

A textual mark.

Syntax: `	extMark` markup or `	extEndMark` markup.

Event classes: `music-event` (page 55), `StreamEvent` (page 58), and `text-mark-event` (page 59).

Accepted by: `Text_mark_engraver` (page 496).

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.
1.1.105 **TextScriptEvent**

Print text.

Event classes: music-event (page 55), script-event (page 57), StreamEvent (page 58), and text-script-event (page 60).

Accepted by: Text_engraver (page 496).

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.

1.1.106 **TextSpanEvent**

Start a text spanner, for example, an octavation.

Event classes: music-event (page 55), span-event (page 58), StreamEvent (page 58), and text-span-event (page 60).

Accepted by: Text_spanner_engraver (page 497).

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.

1.1.107 **TieEvent**

A tie.

Syntax: *note--*

Event classes: music-event (page 55), StreamEvent (page 58), and tie-event (page 60).

Accepted by: Drum_note_performer (page 462), Note_performer (page 483), Tie_engraver (page 497), and Tie_performer (page 497).

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.
1.1.108 **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.sc.

- **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.sc.

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

1.1.109 **TimeSignatureEvent**
An event created when setting a new time signature

Event classes: music-event (page 55), StreamEvent (page 58), and time-signature-event (page 60).

Accepted by: Time_signature_ engraver (page 498), and Time_signature_performer (page 498).

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.

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

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

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

1.1.111 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.

duration-callback (procedure):
    ly:music-wrapper::duration-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.

1.1.112 TremoloEvent
Unmeasured tremolo.

Event classes: music-event (page 55), StreamEvent (page 58), and tremolo-event (page 60).

Accepted by: Stem_engraver (page 494).

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.

### 1.1.113 TremoloRepeatedMusic

Repeated notes denoted by tremolo beams.

Properties:

```scheme
(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.
```

### 1.1.114 TremoloSpanEvent

Tremolo over two stems.

Event classes: music-event (page 55), span-event (page 58), StreamEvent (page 58), and tremolo-span-event (page 60).

Accepted by: Chord_tremolo_engraver (page 456).

Properties:

```scheme
(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.
```
1.1.115 TrillSpanEvent

Start a trill spanner.

Event classes: music-event (page 55), span-event (page 58), StreamEvent (page 58), and trill-span-event (page 60).

Accepted by: Trill_spanner_engraver (page 499).

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.

1.1.116 TupletSpanEvent

Used internally to signal where tuplet brackets start and stop.

Event classes: music-event (page 55), span-event (page 58), StreamEvent (page 58), and tuplet-span-event (page 60).

Accepted by: Tuplet_engraver (page 500).

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.

1.1.117 UnaCordaEvent

Depress or release una-corda pedal.

Event classes: music-event (page 55), pedal-event (page 56), span-event (page 58), StreamEvent (page 58), and una-corda-event (page 60).

Accepted by: Piano_pedal_engraver (page 486), and Piano_pedal_performer (page 487).

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.
1.1.118 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.

1.1.119 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.
1.1.120 UnisonoEvent

Print `a 2`.

Event classes: music-event (page 55), part-combine-event (page 56), StreamEvent (page 58), and unisono-event (page 60).

Accepted by: Part_combine_engraver (page 485).

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.

1.1.121 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.
1.1.122 **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.

1.1.123 **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 55), `StreamEvent` (page 58), `structural-event` (page 59), and `volta-repeat-end-event` (page 61).

Accepted by: `Divisio_engraver` (page 461), `Lyric_repeat_count_engraver` (page 476), `Repeat_acknowledge_engraver` (page 487), and `Signum_repetitionis_engraver` (page 490).

Properties:

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

types (list):
  `(volta-repeat-end-event structural-event event)`
  The types of this music object; determines by what engraver this music expression is processed.

1.1.124 **VoltaRepeatStartEvent**
Signal the start of a volta-style repeat.

Event classes: `music-event` (page 55), `StreamEvent` (page 58), `structural-event` (page 59), and `volta-repeat-start-event` (page 61).

Accepted by: `Divisio_engraver` (page 461), and `Repeat_acknowledge_engraver` (page 487).

Properties:

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

types (list):
  `(volta-repeat-start-event structural-event event)`
  The types of this music object; determines by what engraver this music expression is processed.
1.1.125 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.

1.1.126 VoltaSpanEvent
Used internally to signal where volta brackets start and stop.

- **Event classes:** music-event (page 55), span-event (page 58), StreamEvent (page 58), and volta-span-event (page 61).

- **Accepted by:** Volta_ engraver (page 501).

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.
1.1.127 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.

1.1.128 VowelTransitionEvent

A vowel transition between lyric syllables.

Event classes: music-event (page 55), StreamEvent (page 58), and vowel-transition-event (page 61).

Accepted by: Hyphen_engraver (page 471).

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 464), and Dynamic_performer (page 464).

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 447), and Jump_engraver (page 472).
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 477).

1.2.4 **alternative-event**
Music event type alternative-event is in music objects of type AlternativeEvent (page 2).
   Accepted by: Timing_translator (page 498).

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 447).

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 483).

1.2.7 **arpeggio-event**
Music event type arpeggio-event is in music objects of type ArpeggioEvent (page 3).
   Accepted by: Arpeggio_engraver (page 446).

1.2.8 **articulation-event**
Music event type articulation-event is in music objects of type ArticulationEvent (page 3).
   Accepted by: Beat_engraver (page 452), Beat_performer (page 452), Drum_note_performer (page 462), Note_performer (page 483), and Script_engraver (page 489).

1.2.9 **bar-check-event**
Music event type bar-check-event is in music objects of type BarCheckEvent (page 4).
   Accepted by: Timing_translator (page 498).

1.2.10 **bar-event**
Music event type bar-event is in music objects of type BarEvent (page 4).
   Accepted by: Timing_translator (page 498).

1.2.11 **bass-figure-event**
Music event type bass-figure-event is in music objects of type BassFigureEvent (page 5).
   Accepted by: Figured_bass_engraver (page 465).

1.2.12 **beam-event**
Music event type beam-event is in music objects of type BeamEvent (page 5).
   Accepted by: Beam_engraver (page 451), Beam_performer (page 452), and Grace_beam_engraver (page 469).
1.2.13 beam-forbid-event
Music event type beam-forbid-event is in music objects of type BeamForbidEvent (page 5).
   Accepted by: Auto_beam_engraver (page 446), and Grace_auto_beam_engraver (page 468).

1.2.14 bend-after-event
Music event type bend-after-event is in music objects of type BendAfterEvent (page 6).
   Accepted by: Bend_engraver (page 453).

1.2.15 bend-span-event
Music event type bend-span-event is in music objects of type BendSpanEvent (page 6).
   Accepted by: Bend_spanner_engraver (page 453).

1.2.16 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 464).

1.2.17 break-event
Music event type break-event is in music objects of type LineBreakEvent (page 17), PageBreakEvent (page 23), and PageTurnEvent (page 23).
   Accepted by: Page_turn_engraver (page 484), and Paper_column_engraver (page 484).

1.2.18 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.

1.2.19 breathing-event
Music event type breathing-event is in music objects of type BreathingEvent (page 7).
   Accepted by: Breathing_sign_engraver (page 454), and Note_performer (page 483).

1.2.20 caesura-event
Music event type caesura-event is in music objects of type CaesuraEvent (page 7).
   Accepted by: Bar_engraver (page 447), Caesura_engraver (page 454), and Divisio_engraver (page 461).

1.2.21 cluster-note-event
Music event type cluster-note-event is in music objects of type ClusterNoteEvent (page 7).
   Accepted by: Cluster_spanner_engraver (page 457).

1.2.22 coda-mark-event
Music event type coda-mark-event is in music objects of type CodaMarkEvent (page 8).
   Accepted by: Bar_engraver (page 447), and Mark_tracking_translator (page 477).
1.2.23 *completize-extender-event*
Music event type completize-extender-event is in music objects of type CompletizeExtenderEvent (page 8).
   Accepted by: Extender_engraver (page 465).

1.2.24 *crescendo-event*
Music event type crescendo-event is in music objects of type CrescendoEvent (page 9).
   Accepted by: Dynamic_performer (page 464).

1.2.25 *dal-segno-event*
Music event type dal-segno-event is in music objects of type DalSegnoEvent (page 10).
   Accepted by: Bar_engraver (page 447), Jump_engraver (page 472), and Volta_engraver (page 501).

1.2.26 *decrescendo-event*
Music event type decrescendo-event is in music objects of type DecrescendoEvent (page 10).
   Accepted by: Dynamic_performer (page 464).

1.2.27 *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 462).

1.2.28 *duration-line-event*
Music event type duration-line-event is in music objects of type DurationLineEvent (page 11).
   Accepted by: Duration_line_engraver (page 463).

1.2.29 *dynamic-event*
Music event type dynamic-event is in music objects of type AbsoluteDynamicEvent (page 1).
   Not accepted by any engraver or performer.

1.2.30 *episema-event*
Music event type episema-event is in music objects of type EpisemaEvent (page 11).
   Accepted by: Episema_engraver (page 465).

1.2.31 *extender-event*
Music event type extender-event is in music objects of type ExtenderEvent (page 12).
   Accepted by: Extender_engraver (page 465).

1.2.32 *fine-event*
Music event type fine-event is in music objects of type FineEvent (page 13).
   Accepted by: Bar_engraver (page 447), Divisio_engraver (page 461), Jump_engraver (page 472), Timing_translator (page 498), and Volta_engraver (page 501).
1.2.33 **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.

1.2.34 **fingering-event**

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

Accepted by: Fingering_engraver (page 466), Fretboard_engraver (page 467), and Tab_note_heads_engraver (page 495).

1.2.35 **footnote-event**

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

Not accepted by any engraver or performer.

1.2.36 **general-rest-event**

Music event type `general-rest-event` is in music objects of type `MultiMeasureRestEvent` (page 20), and `RestEvent` (page 29).

Accepted by: Current_chord_text_engraver (page 460).

1.2.37 **glissando-event**

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

Accepted by: Glissando_engraver (page 468).

1.2.38 **harmonic-event**

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

Not accepted by any engraver or performer.

1.2.39 **hyphen-event**

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

Accepted by: Hyphen_engraver (page 471).

1.2.40 **key-change-event**

Music event type `key-change-event` is in music objects of type `KeyChangeEvent` (page 16).

Accepted by: Key_engraver (page 473), and Key_performer (page 474).

1.2.41 **label-event**

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

Accepted by: Paper_column_engraver (page 484).

1.2.42 **laissez-vibrer-event**

Music event type `laissez-vibrer-event` is in music objects of type `LaissezVibrerEvent` (page 17).

Accepted by: Laissez_vibrer_engraver (page 475).

1.2.43 **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.
1.2.44 ligature-event
Music event type ligature-event is in music objects of type LigatureEvent (page 17).
   Accepted by: Kievan_ligature_engraver (page 474), Ligature_bracket_engraver (page 475),
   Mensural_ligature_engraver (page 479), and Vaticana_ligature_engraver (page 500).

1.2.45 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.

1.2.46 lyric-event
Music event type lyric-event is in music objects of type LyricEvent (page 18).
   Accepted by: Lyric_engraver (page 475), and Lyric_performer (page 475).

1.2.47 mark-event
Music event type mark-event is in music objects of type AdHocMarkEvent (page 1),
   and RehearsalMarkEvent (page 28).
   Not accepted by any engraver or performer.

1.2.48 measure-counter-event
Music event type measure-counter-event is in music objects of type MeasureCounterEvent
   (page 19).
   Accepted by: Measure_counter_engraver (page 478).

1.2.49 measure-spanner-event
Music event type measure-spanner-event is in music objects of type MeasureSpannerEvent
   (page 19).
   Accepted by: Measure_spanner_engraver (page 478).

1.2.50 melodic-event
Music event type melodic-event is in music objects of type ClusterNoteEvent (page 7),
   and NoteEvent (page 21).
   Not accepted by any engraver or performer.

1.2.51 multi-measure-articulation-event
Music event type multi-measure-articulation-event is in music objects of type
   MultiMeasureArticulationEvent (page 19).
   Accepted by: Multi_measure_rest_engraver (page 480).

1.2.52 multi-measure-rest-event
Music event type multi-measure-rest-event is in music objects of type
   MultiMeasureRestEvent (page 20).
   Accepted by: Multi_measure_rest_engraver (page 480).

1.2.53 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 480).
1.2.54 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), BarCheckEvent (page 4), 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 8), 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 17), LigatureEvent (page 17), LineBreakEvent (page 17), LyricEvent (page 18), MeasureCounterEvent (page 19), MeasureSpannerEvent (page 19), MultiMeasureArticulationEvent (page 19), MultiMeasureRestEvent (page 20), MultiMeasureTextEvent (page 20), NoteEvent (page 21), NoteGroupingEvent (page 22), OttavaEvent (page 22), PageBreakEvent (page 23), PageTurnEvent (page 23), PartialEvent (page 24), PercentEvent (page 24), PesOrFlexaEvent (page 25), PhrasingSlurEvent (page 26), RehearsalMarkEvent (page 28), RepeatSlashEvent (page 29), RepeatTieEvent (page 29), RestEvent (page 29), ScriptEvent (page 30), SectionEvent (page 31), SectionLabelEvent (page 31), SegnoMarkEvent (page 31), SkipEvent (page 34), SlurEvent (page 35), SoloOneEvent (page 36), SoloTwoEvent (page 36), SostenutoEvent (page 36), SpacingSectionEvent (page 37), SpanEvent (page 37), StaffHighlightEvent (page 37), StaffSpanEvent (page 38), StringNumberEvent (page 38), StrokeFingerEvent (page 38), SustainEvent (page 39), TempoChangeEvent (page 39), TextMarkEvent (page 39), TextScriptEvent (page 40), TextSpanEvent (page 40), TieEvent (page 40), TimeSignatureEvent (page 41), TremoloEvent (page 42), TremoloSpanEvent (page 43), TrillSpanEvent (page 44), TupletSpanEvent (page 44), UnaCordaEvent (page 44), UnisonoEvent (page 46), VoltaRepeatEndEvent (page 47), VoltaRepeatStartEvent (page 47), VoltaSpanEvent (page 48), and VowelTransitionEvent (page 49).

Not accepted by any engraver or performer.

1.2.55 note-event

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

Accepted by: Beat_ engraver (page 452), Beat_performer (page 452), Bend_spanner_ engraver (page 453), Completion_heads_ engraver (page 457), Current_chord_text_ engraver (page 460), Drum_note_performer (page 462), Drum_notes_ engraver (page 462), Finger_glide_ engraver (page 466), Fretboard_ engraver (page 467), Note_heads_ engraver (page 482), Note_name_ engraver (page 482), Note_ performer (page 483), Part_combine_ engraver (page 485), Phrasing_slur_ engraver (page 485), Slur_ engraver (page 491), and Tab_note_heads_ engraver (page 495).

1.2.56 note-grouping-event

Music event type note-grouping-event is in music objects of type NoteGroupingEvent (page 22).

Accepted by: Horizontal_bracket_ engraver (page 471).

1.2.57 ottava-event

Music event type ottava-event is in music objects of type OttavaEvent (page 22).

Accepted by: Ottava_spanner_ engraver (page 483).
1.2.58 **page-break-event**
Music event type page-break-event is in music objects of type PageBreakEvent (page 23).
   Not accepted by any engraver or performer.

1.2.59 **page-turn-event**
Music event type page-turn-event is in music objects of type PageTurnEvent (page 23).
   Not accepted by any engraver or performer.

1.2.60 **part-combine-event**
Music event type part-combine-event is in music objects of type SoloOneEvent (page 36),
SoloTwoEvent (page 36), and UnisonoEvent (page 46).
   Accepted by: Part_combine_ engraver (page 485).

1.2.61 **partial-event**
Music event type partial-event is in music objects of type PartialEvent (page 24).
   Accepted by: Timing_ engraver (page 498).

1.2.62 **pedal-event**
Music event type pedal-event is in music objects of type SostenutoEvent (page 36),
SustainEvent (page 39), and UnaCordaEvent (page 44).
   Not accepted by any engraver or performer.

1.2.63 **percent-event**
Music event type percent-event is in music objects of type PercentEvent (page 24).
   Accepted by: Percent_repeat_ engraver (page 485).

1.2.64 **pes-or-flexa-event**
Music event type pes-or-flexa-event is in music objects of type PesOrFlexaEvent (page 25).
   Accepted by: Vaticana_ ligature_ engraver (page 500).

1.2.65 **phrasing-slur-event**
Music event type phrasing-slur-event is in music objects of type PhrasingSlurEvent (page 26).
   Accepted by: Phrasing_slur_ engraver (page 485).

1.2.66 **rehearsal-mark-event**
Music event type rehearsal-mark-event is in music objects of type RehearsalMarkEvent (page 28).
   Accepted by: Mark_tracking_ translator (page 477).

1.2.67 **repeat-slash-event**
Music event type repeat-slash-event is in music objects of type RepeatSlashEvent (page 29).
   Accepted by: Slash_repeat_ engraver (page 490).

1.2.68 **repeat-tie-event**
Music event type repeat-tie-event is in music objects of type RepeatTieEvent (page 29).
   Accepted by: Repeat_tie_ engraver (page 488).
1.2.69 rest-event
Music event type rest-event is in music objects of type RestEvent (page 29).

   Accepted by: Completion_rest_engraver (page 458), Figured_bass_engraver (page 465), and Rest_engraver (page 488).

1.2.70 rhythmic-event
Music event type rhythmic-event is in music objects of type BassFigureEvent (page 5), ClusterNoteEvent (page 7), DoublePercentEvent (page 10), LyricEvent (page 18), MultiMeasureRestEvent (page 20), NoteEvent (page 21), RepeatSlashEvent (page 29), RestEvent (page 29), and SkipEvent (page 34).

   Not accepted by any engraver or performer.

1.2.71 script-event
Music event type script-event is in music objects of type ArticulationEvent (page 3), ScriptEvent (page 30), and TextScriptEvent (page 40).

   Not accepted by any engraver or performer.

1.2.72 section-event
Music event type section-event is in music objects of type SectionEvent (page 31).

   Accepted by: Bar_engraver (page 447), and Divisio_engraver (page 461).

1.2.73 section-label-event
Music event type section-label-event is in music objects of type SectionLabelEvent (page 31).

   Accepted by: Mark_tracking_translator (page 477).

1.2.74 segno-mark-event
Music event type segno-mark-event is in music objects of type SegnoMarkEvent (page 31).

   Accepted by: Bar_engraver (page 447), and Mark_tracking_translator (page 477).

1.2.75 skip-event
Music event type skip-event is in music objects of type SkipEvent (page 34).

   Not accepted by any engraver or performer.

1.2.76 slur-event
Music event type slur-event is in music objects of type SlurEvent (page 35).

   Accepted by: Slur_engraver (page 491), and Slur_performer (page 491).

1.2.77 solo-one-event
Music event type solo-one-event is in music objects of type SoloOneEvent (page 36).

   Not accepted by any engraver or performer.

1.2.78 solo-two-event
Music event type solo-two-event is in music objects of type SoloTwoEvent (page 36).

   Not accepted by any engraver or performer.
1.2.79 sostenuto-event
Music event type sostenuto-event is in music objects of type SostenutoEvent (page 36).
   Accepted by: Piano_pedal_ engraver (page 486), and Piano_pedal_performer (page 487).

1.2.80 spacing-section-event
Music event type spacing-section-event is in music objects of type SpacingSectionEvent (page 37).
   Accepted by: Spacing_ engraver (page 491).

1.2.81 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 464).

1.2.82 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 17), MeasureCounterEvent (page 19), MeasureSpannerEvent (page 19), PhrasingSlurEvent (page 26), SlurEvent (page 35), SostenutoEvent (page 36), SpanEvent (page 37), StaffHighlightEvent (page 37), StaffSpanEvent (page 38), SustainEvent (page 39), TextSpanEvent (page 40), TremoloSpanEvent (page 43), TrillSpanEvent (page 44), TupletSpanEvent (page 44), UnaCordaEvent (page 44), and VoltaSpanEvent (page 48).
   Not accepted by any engraver or performer.

1.2.83 staff-highlight-event
Music event type staff-highlight-event is in music objects of type StaffHighlightEvent (page 37).
   Accepted by: Staff_highlight_ engraver (page 493).

1.2.84 staff-span-event
Music event type staff-span-event is in music objects of type StaffSpanEvent (page 38).
   Accepted by: Staff_symbol_ engraver (page 493).

1.2.85 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), BarCheckEvent (page 4), 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), CompletizteExtenderEvent (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 16), LabelEvent (page 16), LaissezVibrerEvent (page 17), LigatureEvent (page 17), LineBreakEvent
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Music event type string-number-event is in music objects of type StringNumberEvent (page 38).

Accepted by: Bend_spanner_engraver (page 453), Fretboard_engraver (page 467), and Tab_note_heads_engraver (page 495).

Music event type stroke-finger-event is in music objects of type StrokeFingerEvent (page 38).

Not accepted by any engraver or performer.

Music event type structural-event is in music objects of type AlternativeEvent (page 2), CodaMarkEvent (page 8), DalSegnoEvent (page 10), FineEvent (page 13), SectionEvent (page 31), SegnoMarkEvent (page 31), VoltaRepeatEndEvent (page 47), and VoltaRepeatStartEvent (page 47).

Not accepted by any engraver or performer.

Music event type sustain-event is in music objects of type SustainEvent (page 39).

Accepted by: Piano_pedal_engraver (page 486), and Piano_pedal_performer (page 487).

Music event type tempo-change-event is in music objects of type TempoChangeEvent (page 39).

Accepted by: Metronome_mark_engraver (page 479).

Music event type text-mark-event is in music objects of type TextMarkEvent (page 39).

Accepted by: Text_mark_engraver (page 496).
1.2.92 text-script-event
Music event type \textit{text-script-event} is in music objects of type TextScriptEvent (page 40).
   Accepted by: Text\_ engraver (page 496).

1.2.93 text-span-event
Music event type \textit{text-span-event} is in music objects of type TextSpanEvent (page 40).
   Accepted by: Text\_spanner\_engraver (page 497).

1.2.94 tie-event
Music event type \textit{tie-event} is in music objects of type TieEvent (page 40).
   Accepted by: Drum\_note\_performer (page 462), Note\_performer (page 483),
              Tie\_engraver (page 497), and Tie\_performer (page 497).

1.2.95 time-signature-event
Music event type \textit{time-signature-event} is in music objects of type TimeSignatureEvent (page 41).
   Accepted by: Time\_signature\_engraver (page 498), and Time\_signature\_performer (page 498).

1.2.96 tremolo-event
Music event type \textit{tremolo-event} is in music objects of type TremoloEvent (page 42).
   Accepted by: Stem\_engraver (page 494).

1.2.97 tremolo-span-event
Music event type \textit{tremolo-span-event} is in music objects of type TremoloSpanEvent (page 43).
   Accepted by: Chord\_tremolo\_engraver (page 456).

1.2.98 trill-span-event
Music event type \textit{trill-span-event} is in music objects of type TrillSpanEvent (page 44).
   Accepted by: Trill\_spanner\_engraver (page 499).

1.2.99 tuplet-span-event
Music event type \textit{tuplet-span-event} is in music objects of type TupletSpanEvent (page 44).
   Accepted by: Tuplet\_engraver (page 500).

1.2.100 una-corda-event
Music event type \textit{una-corda-event} is in music objects of type UnaCordaEvent (page 44).
   Accepted by: Piano\_pedal\_engraver (page 486), and Piano\_pedal\_performer (page 487).

1.2.101 unisono-event
Music event type \textit{unisono-event} is in music objects of type UnisonoEvent (page 46).
   Not accepted by any engraver or performer.
1.2.102 volta-repeat-end-event
Music event type volta-repeat-end-event is in music objects of type VoltaRepeatEndEvent (page 47).
Accepted by: Divisio_engraver (page 461), Lyric_repeat_count_engraver (page 476), Repeat_acknowledge_engraver (page 487), and Signum_repetitionis_engraver (page 490).

1.2.103 volta-repeat-start-event
Music event type volta-repeat-start-event is in music objects of type VoltaRepeatStartEvent (page 47).
Accepted by: Divisio_engraver (page 461), and Repeat_acknowledge_engraver (page 487).

1.2.104 volta-span-event
Music event type volta-span-event is in music objects of type VoltaSpanEvent (page 48).
Accepted by: Volta_engraver (page 501).

1.2.105 vowel-transition-event
Music event type vowel-transition-event is in music objects of type VowelTransitionEvent (page 49).
Accepted by: Hyphen_engraver (page 471).

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.

cautonary (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 instanciated instead of a score.

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

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 pro-
cessed.

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 529), InstrumentName (page 612), SpanBarStub (page 686), StaffGrouper (page 689), SystemStartBar (page 704), SystemStartBrace (page 705), SystemStartBracket (page 706), SystemStartSquare (page 707), and VerticalAlignment (page 732).

This context sets the following properties:

- Revert grob property extra-spacing-width in DynamicText (page 590),
- 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 590), to #f.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Staff (page 305).

Context ChoirStaff can contain ChoirStaff (page 68), ChordNames (page 98), Devnull (page 111), DrumStaff (page 111), Dynamics (page 129), FiguredBass (page 135), FretBoards (page 136), GrandStaff (page 138), GregorianTranscriptionLyrics (page 140), GregorianTranscriptionStaff (page 143), KievanStaff (page 193), Lyrics (page 216), MensuralStaff (page 219), NoteNames (page 243), OneStaff (page 247), PetrucciStaff (page 248), PianoStaff (page 273), RhythmicStaff (page 275), Staff (page 305), StaffGroup (page 318), TabStaff (page 360), VaticanaLyrics (page 383), and VaticanaStaff (page 409).

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

Instrument_name_engraver (page 471)
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 612).

Output_property_engraver (page 483)
   Apply a procedure to any grob acknowledged.
   Music types accepted: apply-output-event (page 50),

Span_arpeggio_engraver (page 492)
   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 529).

Span_bar_stub_engraver (page 492)
   Make stubs for span bars in all contexts that the span bars cross.
   This engraver creates the following layout object(s): SpanBarStub (page 686).

System_start_delimiter_engraver (page 494)
   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 704), SystemStartBrace (page 705), SystemStartBracket (page 706), and
   SystemStartSquare (page 707).

Vertical_align_engraver (page 500)
   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 689), and
   VerticalAlignment (page 732).
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 305).

This context creates the following layout object(s): BarLine (page 532), ChordSquare (page 557), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584), GridChordName (page 605), PercentRepeat (page 658), PercentRepeatCounter (page 660), StaffSymbol (page 691), SystemStartBar (page 704), SystemStartBrace (page 705), SystemStartBracket (page 706), SystemStartSquare (page 707), and VerticalAxisGroup (page 732).

This context sets the following properties:

- Set grob property `font-size` in BarLine (page 532), to 3.
- Set grob property `hair-thickness` in BarLine (page 532), to 2.
- Set grob property `kern` in BarLine (page 532), to 5.
- Set grob property `line-positions` in StaffSymbol (page 691), to `((-13.5 13.5))`.
- Set grob property `thickness` in StaffSymbol (page 691), to 2.
- Set grob property `thickness` in SystemStartBar (page 704), 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 445)

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 447)

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 732).
Bar\_engraver (page 447)

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 49), caesura-event (page 51), coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52), section-event (page 57), and segno-mark-event (page 57).

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 #t, Bar_engraver forbids line breaks where there is no bar line.

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

printInitialRepeatBar (boolean)
  Use a special bar line at the start of a volta repeat even at the beginning
  of the piece.

printTrivialVoltaRepeats (boolean)
  Notate volta-style repeats even when the repeat count is 1.

repeatCommands (list)
  A list of commands related to volta-style repeats. In general, each ele-
  ment 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 return-count
    End a repeated section. \return-count is the number of times to go
    back from this point to the beginning of the section.

  start-repeat repeat-count
    Start a repeated section. \repeat-count is the number of times to
    perform this 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 532).

Chord_square_engraver (page 456)
    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 557).

Current_chord_text_engraver (page 460)
    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 53), and note-event (page 55).

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 462)
Make double measure repeats.
Music types accepted: double-percent-event (page 52),
Properties (read)
  countPercentRepeats (boolean)
  If set, produce counters for percent repeats.
  measureLength (positive moment with no grace part)
  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 re-
  quested by the user.
This engraver creates the following layout object(s): DoublePercentRepeat
  (page 583), and DoublePercentRepeatCounter (page 584).

Grid_chord_name_engraver (page 470)
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 605).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Percent_repeat_engraver (page 485)
Make whole measure repeats.
Music types accepted: percent-event (page 56),
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 658),
and PercentRepeatCounter (page 660).

Staff_symbol_engraver (page 493)
Create the constellation of five (default) staff lines.
Music types accepted: staff-span-event (page 58),
This this engraver creates the following layout object(s): StaffSymbol (page 691).

System_start_delimiter_engraver (page 494)
Create a system start delimiter (i.e., a SystemStartBar, SystemStartBracket,
SystemStartBrace 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 704), SystemStartBrace (page 705), SystemStartBracket (page 706), and
SystemStartSquare (page 707).

2.1.3 ChordGridScore
Top-level context replacing Score in chord grid notation. Compared to Score, it uses propor-
tional notation, and has a few other settings like removing bar numbers.
This context also accepts commands for the following context(s): Score (page 281), and
Timing (page 281).
This context creates the following layout object(s): BreakAlignGroup (page 548),
BreakAlignment (page 549), CenteredBarNumberLineSpanner (page 555), CodaMark
(page 564), ControlPoint (page 568), ControlPolygon (page 569), Footnote (page 600),
GraceSpacing (page 605), JumpScript (page 614), LeftEdge (page 625), MetronomeMark
(page 640), NonMusicalPaperColumn (page 649), PaperColumn (page 656), Parentheses
(page 657), RehearsalMark (page 664), SectionLabel (page 672), SegnoMark
(page 674), SpacingSpanner (page 684), StaffGrouper (page 689), TextMark (page 710),
VerticalAlignment (page 732), VoltaBracket (page 735), and VoltaBracketSpanner
(page 736).
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 at lily/music-functions.scm:1716:0 (context pitch barnum))
• 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-
• Set context property beamHalfMeasure to #t.
• Set context property breathMarkDefinitions to:
  '(((altcomma
      (text #<procedure musicglyph-markup (layout props glyph-name)>
       "scripts.raltcomma")
  (caesura
      (text #<procedure musicglyph-markup (layout props glyph-name)>
       "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 (grob)>)
      (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 (grob)>)
      (extra-spacing-width -1.0 . 0.0)
      (stencil
         .
         #<procedure ly:breathing-sign::divisio-minima (_)>>
(comma (text #<procedure musicglyph-markup (layout props glyph-name)> "scripts.rcomma"))

curvedcaesura
(text #<procedure musicglyph-markup (layout props glyph-name)> "scripts.caesura.curved")

(outsidecomma
(outside-staff-priority . 40)
(text #<procedure musicglyph-markup (layout props glyph-name)> "scripts.rcomma")

(spacer
(text #<procedure null-markup (layout props)>))

tickmark
(outside-staff-priority . 40)
(text #<procedure musicglyph-markup (layout props glyph-name)> "scripts.tickmark")

(upbow (outside-staff-priority . 40)
(text #<procedure musicglyph-markup (layout props glyph-name)> "scripts.upbow")

(varcomma
(text #<procedure musicglyph-markup (layout props glyph-name)> "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 (layout props args)> ("+"))
  ((#<Pitch ees' > #<Pitch ges' >)
    #<procedure line-markup (layout props args)> (((#<procedure line-markup (layout props args)> ((#<procedure fontsize-markup (layout props increment arg)> 2
    "\xB0")))))
  ((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >)
    #<procedure concat-markup (layout props args)> (((#<procedure super-markup (layout props arg)> "ø")))))
  ((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >)
    #<procedure concat-markup (layout props args)> (((#<procedure line-markup (layout props args)> ((#<procedure fontsize-markup (layout props increment arg)> 2
    "\")"))))
  ((#<Pitch e' > #<Pitch g' > #<Pitch b' > #<Pitch fis'' >)
    #<procedure super-markup (layout props arg)> "7")))
  ((#<Pitch e' >
    #<Pitch g' >
    #<Pitch b' >
    #<Pitch fis'' >))

Chapter 2: Translation
• Set context property chordNameFunction to ignatzek-chord-names.
• Set context property chordNameLowercaseMinor to #f.
• Set context property chordNameSeparator to: '#(<procedure hspace-markup (layout props amount)> 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 at lily/translation-functions.scm:222:4 (number context)>.
• 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>.
• 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 (layout props args)>
     ((\#<procedure fontsize-markup (layout props increment arg)> -3
      \#<procedure triangle-markup (layout props filled)> #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 middleClefPosition to -6.
• Set context property middleC_position to -6.
• Set context property minorChordModifier to "m".
• Set context property noChordSymbol to "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 partCombineTextsOnNotes 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 printInitialRepeatBar to #t.
• Set context property printKeyCancellation to #t.
• Set context property printOctaveNames to #f.
• Set context property printPartCombineTexts to #t.
• Set context property printTrivialVoltaRepeats to #f.
• 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 at
  lily/translation-functions.scm:222:4 (number context)>.
• 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:

```plaintext
'(accent
  (avoid-slur . around)
  (padding . 0.2)
  (script-stencil feta "sforzato" . "sforzato")
  (side-relative-direction . -1))
(accents
  (script-stencil feta "uaccent" . "uaccent")
  (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 . 180))
(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)
  (outside-staff-priority . 75)
  (script-priority . 175)
  (direction . 1))
(flageolet
  (script-stencil feta "flageolet" . "flageolet")
  (padding . 0.2)
  (avoid-slur . around)
  (direction . 1)
  (script-priority . 50))
(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)
(outside-staff-priority . 75)
(script-priority . 175)
(direction . 1))

(henzeshortfermata
(script-stencil
 feta
 "dhenzeshortfermata"
 .
 "uhenzeshortfermata")
(padding . 0.4)
(avoid-slur . around)
(outside-staff-priority . 75)
(script-priority . 175)
(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)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (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))
(semicolon
  (script-stencil
   feta
   "dsemicolon"
   .
   "dsemicolon")
  (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)
  (outside-staff-priority . 75)
  (script-priority . 175)
  (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 . 150))
(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 . 180))

(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))

(varcomma
(script-stencil feta "varcomma" . "varcomma")
(padding . 0.2)
(avoid-slur . outside)
(direction . 1))

(varcoda
(script-stencil feta "varcoda" . "varcoda")
(padding . 0.2)
(avoid-slur . outside)
(direction . 1))

(verylongfermata
(script-stencil
  feta
  "dverylongfermata"
  .
  "uverylongfermata")
(padding . 0.4)
(avoid-slur . around)
(outside-staff-priority . 75)
(script-priority . 175)
(direction . 1))

(veryshortfermata
(script-stencil
  feta
  "dveryshortfermata"
  .
  "uveryshortfermata")
(padding . 0.4)
(avoid-slur . around)
(outside-staff-priority . 75)
(script-priority . 175)
(direction . 1))
• Set context property sectionBarType to ":\|:"
• Set context property segnoBarType to ":S:
• Set context property segnoMarkFormatter to \texttt{format-segno-mark-considering-bar-lines}.
• Set context property segnoStyle to \texttt{mark}.
• Set context property slashChordSeparator to "/\".
• 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:
  
  '\(\left\{\begin{array}{ll}
  \text{up} & \text{down}
  \end{array}\right.\)\'

• Set context property stringOneTopmost to \#t.
• Set context property stringTunings to:

  \[
  (\#<\text{Pitch e'} > \#<\text{Pitch b} > \#<\text{Pitch g} > \#<\text{Pitch d} > \#<\text{Pitch a, } > \#<\text{Pitch e, } > )
  \]

• Set context property strokeFingerOrientations to:

  '\(\left\{\begin{array}{ll}
  \text{right}
  \end{array}\right.\)\'

• Set context property subdivideBeams to \#f.
• Set context property suspendMelodyDecisions to \#f.
• Set context property systemStartDelimiter to \'\texttt{SystemStartBar}\'.
• Set context property tablatureFormat to \texttt{fret-number-tablature-format}.
• Set context property tabStaffLineLayoutFunction to \texttt{tablature-position-on-lines}.
• Set context property tieWaitForNote to \#f.
• Set context property timeSignatureFraction to:

  '\(4 . 4\)\'

• Set context property timeSignatureSettings to:

  '\(\left\{\begin{array}{ll}
  (4 , 2) (\text{beamExceptions } (\text{end } (1/32 8 8 8 8)))
  (3 , 2) (\text{beamExceptions } (\text{end } (1/32 8 8 8 8)))
  (3 , 4) (\text{beamExceptions } (\text{end } (1/8 6) (1/12 3 3 3)))
  (3 , 8) (\text{beamExceptions } (\text{end } (1/8 3)))
  (4 , 2) (\text{beamExceptions } (\text{end } (1/16 4 4 4 4 4 4 4 4)))
  (4 , 4) (\text{beamExceptions } (\text{end } (1/8 4 4) (1/12 3 3 3 3)))
  (4 , 8) (\text{beamStructure } 2 2)
  (6 , 4) (\text{beamExceptions } (\text{end } (1/16 4 4 4 4 4)))
  (9 , 4) (\text{beamExceptions } (\text{end } (1/32 8 8 8 8 8 8)))
  (12 , 4)
  \end{array}\right.\)\'
• 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 305).

Context ChordGridScore can contain ChoirStaff (page 68), ChordGrid (page 70), ChordNames (page 98), Devnull (page 111), DrumStaff (page 111), Dynamics (page 129), FiguredBass (page 135), FretBoards (page 136), GrandStaff (page 138), GregorianTranscriptionLyrics (page 140), GregorianTranscriptionStaff (page 143), KievanStaff (page 193), Lyrics (page 216), MensuralStaff (page 219), NoteNames (page 243), OneStaff (page 247), PetrucciStaff (page 248), PianoStaff (page 273), RhythmicStaff (page 275), Staff (page 305), StaffGroup (page 318), TabStaff (page 360), VaticanaLyrics (page 383), and VaticanaStaff (page 409).

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

Beam_collision_engraver (page 451)
   Help beams avoid colliding with notes and clefs in other voices.

Break_align_engraver (page 454)
   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 548), BreakAlignment (page 549), and LeftEdge (page 625).

Centered_bar_number_align_engraver (page 455)
   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 555).

Concurrent_hairpin_engraver (page 459)
   Collect concurrent hairpins.

Footnote_engraver (page 467)
   Create footnote texts.
   This engraver creates the following layout object(s): Footnote (page 600).

Grace_spacing_engraver (page 469)
   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 605).

Jump engraver (page 472)
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 492), also needs to be there so that marks appear at the intended Y location.
Music types accepted: ad-hoc-jump-event (page 49), dal-segno-event (page 52), and fine-event (page 52),

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 arg-
uments 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 per-
formed.
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 num-
ber 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 614).

Mark_engraver (page 476)
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 492), 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 477). 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 564), RehearsalMark (page 664), SectionLabel (page 672), and SegnoMark (page 674).

Mark_tracking_translator (page 477)
This translator chooses which marks Mark_engraver should engrave.
Music types accepted: ad-hoc-mark-event (page 50), coda-mark-event (page 51), rehearsal-mark-event (page 56), section-label-event (page 57), and segno-mark-event (page 57),

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 479)
   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 492.
   Music types accepted: tempo-change-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.).

   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 640).
Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Paper_column_engraver (page 484)
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 51), and label-event (page 53),
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 649), and PaperColumn (page 656).

Parenthesis_engraver (page 484)
Parenthesize objects whose parenthesize property is #t.
This engraver creates the following layout object(s): Parentheses (page 657).

Repeat_acknowledge_engraver (page 487)
This translator adds entries to repeatCommands for events generated by \repeat volta.
Music types accepted: volta-repeat-end-event (page 61), and volta-repeat-start-event (page 61),
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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.
start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 490)
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 568), and ControlPolygon (page 569).

Spacing_engraver (page 491)
Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.
Music types accepted: spacing-section-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.).
  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 684).

Spanner_tracking_engraver (page 492)
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 492)
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 494)
This engraver ensures that stanza numbers are neatly aligned.

Text_mark_engraver (page 496)
Engraves arbitrary textual marks.
Music types accepted: text-mark-event (page 59),
Properties (read)
  stavesFound (list of grobs)
  A list of all staff-symbols found.
This engraver creates the following layout object(s): TextMark (page 710).

**Timing_translator** (page 498)
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 50), bar-check-event (page 50), bar-event (page 50), fine-event (page 52), and partial-event (page 56),

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** (positive moment with no grace part)
  Smallest unit of time that will stand on its own as a subdivided section.

- **currentBarNumber** (integer)
  Contains the current bar number. This property is incremented at every bar line.

- **internalBarNumber** (integer)
  Contains the current bar number. This property is used for internal time-keeping, among others by the Accidental_engraver.

- **measureLength** (positive moment with no grace part)
  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** (positive, finite 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** (positive moment with no grace part)
  Smallest unit of time that will stand on its own as a subdivided section.

- **currentBarNumber** (integer)
  Contains the current bar number. This property is incremented at every bar line.

- **internalBarNumber** (integer)
  Contains the current bar number. This property is used for internal time-keeping, among others by the Accidental_engraver.

- **measureLength** (positive moment with no grace part)
  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 (positive, finite fraction, as pair)
A pair of numbers, signifying the time signature. For example, '(4 . 4) is a 4/4 time signature.

Tweak_engraver (page 500)
Read the tweaks property from the originating event, and set properties.

Vertical_align_engraver (page 500)
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 689), and VerticalAlignment (page 732).

Volta_engraver (page 501)
Make volta brackets.
Music types accepted: dal-segno-event (page 52), fine-event (page 52), and volta-span-event (page 61),
Properties (read)
currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable items (clef, key signature, etc.).

printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.
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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 (non-negative moment with no grace part)
The maximum musical length of a VoltaBracket when its musical-length property is not set.
This property is deprecated; overriding the musical-length property of VoltaBracket is recommended.

This engraver creates the following layout object(s): VoltaBracket (page 735), and VoltaBracketSpanner (page 736).

2.1.4 ChordNames
Typesets chord names.
This context also accepts commands for the following context(s): Staff (page 305).
This context creates the following layout object(s): ChordName (page 556), StaffSpacing (page 691), and VerticalAxisGroup (page 732).
This context sets the following properties:
• Set grob property font-size in Parentheses (page 657), to 1.5.
• Set grob property nonstaff-nonstaff-spacing.padding in VerticalAxisGroup (page 732), to 0.5.
• Set grob property nonstaff-relatedstaff-spacing.padding in VerticalAxisGroup (page 732), to 0.5.
• Set grob property remove-empty in VerticalAxisGroup (page 732), to #t.
• Set grob property remove-first in VerticalAxisGroup (page 732), to #t.
• Set grob property staff-affinity in VerticalAxisGroup (page 732), 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 445)
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)
A list 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 447)
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 732).

Chord_name_engraver (page 455)
  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 556).

Current_chord_text_engraver (page 460)
  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 53), and note-event (page 55),
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 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Pure_from_neighbor_engraver (page 487)
Coordinates items that get their pure heights from their neighbors.

Separating_line_group_engraver (page 489)
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 691).

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 433).

This context creates the following layout object(s): Arpeggio (page 529), Beam (page 542), BendAfter (page 545), BreathingSign (page 550), ClusterSpanner (page 563), ClusterSpannerBeacon (page 564), CombineTextScript (page 566), Dots (page 582), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner (page 592), FingerGlideSpanner (page 595), Fingering (page 597), Flag (page 599), Glissando (page 603), Hairpin (page 607), InstrumentSwitch (page 613), LaissezVibrerTie (page 623), LaissezVibrerTieColumn (page 624), LigatureBracket (page 627), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), NoteColumn (page 651), NoteHead (page 652), NoteSpacing (page 654), PercentRepeat (page 658), PercentRepeatCounter (page 660), PhrasingSlur (page 661), RepeatSlash (page 666), RepeatTie (page 667), RepeatTieColumn (page 668), Rest (page 669), Script (page 670), ScriptColumn (page 672), Slur (page 680), Stem (page 683), StemStub (page 695), StemTremolo (page 696), StringNumber (page 697), StrokeFinger (page 699), TextScript (page 712), TextSpanner (page 714), Tie (page 715), TieColumn (page 717), TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), TrillPitchParentheses (page 723), TrillSpanner (page 724), TupletBracket (page 725), TupletNumber (page 727), and VoiceFollower (page 734).

This context sets the following properties:
- Set context property fontSize to -4.
- Set grob property beam-thickness in Beam (page 542), to 0.35.
- Set grob property beam-thickness in StemTremolo (page 696), to 0.35.
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- Set grob property `ignore-ambitus` in `NoteHead` (page 652), to `#t`.
- Set grob property `length-fraction` in `Beam` (page 542), to `0.6299605249474366`.
- Set grob property `length-fraction` in `Stem` (page 693), 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 446)
Generate an Arpeggio symbol.
Music types accepted: `arpeggio-event` (page 50),
This engraver creates the following layout object(s): `Arpeggio` (page 529).

**Auto_beam_engraver** (page 446)
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 494, properties `stemLeftBeamCount` and `stemRightBeamCount`.
Music types accepted: `beam-forbid-event` (page 51),
Properties (read)

  - `autoBeaming` (boolean)
    If set to `#t` then beams are generated automatically. If set to `#f`, auto-beaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.

  - `baseMoment` (positive moment with no grace part)
    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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `maxSubdivideInterval`, between beats at multiples of `minSubdivideInterval`.

This engraver creates the following layout object(s): `Beam` (page 542).

**Beam_engraver** (page 451)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted: `beam-event` (page 50),
Properties (read)

  - `baseMoment` (positive moment with no grace part)
    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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Bend_engraver (page 453)
Create fall spanners.
Music types accepted: bend-after-event (page 51),
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 545).

Breathing_sign_engraver (page 454)
Notate breath marks.
Music types accepted: breathing-event (page 51),
Properties (read)

breathMarkType (symbol)
The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 550).

Chord_tremolo_engraver (page 456)
Generate beams for tremolo repeats.
Music types accepted: tremolo-span-event (page 60),
This engraver creates the following layout object(s): Beam (page 542).

Cluster_spanner_engraver (page 457)
Engrave a cluster using Spanner notation.
Music types accepted: cluster-note-event (page 51),
This engraver creates the following layout object(s): ClusterSpanner (page 563),
and ClusterSpannerBeacon (page 564).

Dots_engraver (page 462)
Create Section 3.1.43 [Dots], page 582, objects for Section 3.2.119 [rhythmic-head-interface], page 801s.
This engraver creates the following layout object(s): Dots (page 582).

Double_percent_repeat_engraver (page 462)
Make double measure repeats.
Music types accepted: double-percent-event (page 52),
Properties (read)

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

    measureLength (positive moment with no grace part)
        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 re-
        quested by the user.

This engraver creates the following layout object(s): DoublePercentRepeat
(page 583), and DoublePercentRepeatCounter (page 584).

Dynamic_align_engraver (page 463)
    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 589).

Dynamic_engraver (page 464)
    Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: absolute-dynamic-event (page 49),
break-dynamic-span-event (page 51), and span-dynamic-event
(page 58).

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 590),
DynamicTextSpanner (page 592), and Hairpin (page 607).
Finger_glide_engraver (page 466)
Engraver to print a line between two Fingering grobs.
Music types accepted: note-event (page 55),
This engraver creates the following layout object(s): FingerGlideSpanner (page 595).

Fingering_engraver (page 466)
Create fingering scripts.
Music types accepted: fingering-event (page 53),
This engraver creates the following layout object(s): Fingering (page 597).

Font_size_engraver (page 466)
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 467)
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 re-
quested by the user.

Glissando_engraver (page 468)
Engrave glissandi.
Music types accepted: glissando-event (page 53),
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 num-
ber of note-heads in the two note columns between which the glissandi
occur.
This engraver creates the following layout object(s): Glissando (page 603).

Grace_auto_beam_engraver (page 468)
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 51),
Properties (read)
autoBeaming (boolean)
If set to #t then beams are generated automatically. If set to #f, auto-
beaming is switched off as soon as the current beam (if any) is finished
according to the auto-beaming rules.
This engraver creates the following layout object(s): Beam (page 542).

**Grace_beam_engraver** (page 469)
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 50),

Properties (read)

- **baseMoment** (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

**Grace_engraver** (page 469)
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 470)
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 472)
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 613).
Laissez_vibrer_engraver (page 475)
Create laissez vibrer items.
Music types accepted: laissez-vibrer-event (page 53),
This engraver creates the following layout object(s): LaissezVibrerTie (page 623),
and LaissezVibrerTieColumn (page 624).

Ligature_bracket_engraver (page 475)
Handle Ligature_events by engraving Ligature brackets.
Music types accepted: ligature-event (page 54),
This engraver creates the following layout object(s): LigatureBracket (page 627).

Multi_measure_rest_engraver (page 480)
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 642.
Music types accepted: multi-measure-articulation-event (page 54),
multi-measure-rest-event (page 54), and multi-measure-text-event (page 54),
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 bar number. 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 642),
MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), and
MultiMeasureRestText (page 647).

New_fingering_engraver (page 481)
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 597), Script
(page 670), StringNumber (page 697), and StrokeFinger (page 699).
Note_head_line_engraver (page 482)
   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 734).

Note_heads_engraver (page 482)
   Generate note heads.
   Music types accepted: note-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.

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

   This engraver creates the following layout object(s): NoteHead (page 652).

Note_spacing_engraver (page 483)
   Generate NoteSpacing, an object linking horizontal lines for use in spacing.
   This engraver creates the following layout object(s): NoteSpacing (page 654).

Output_property_engraver (page 483)
   Apply a procedure to any grob acknowledged.
   Music types accepted: apply-output-event (page 50),

Part_combine_engraver (page 485)
   Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
   Music types accepted: note-event (page 55), and part-combine-event (page 56),
   Properties (read)

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

   partCombineTextsOnNote (boolean)
      Print part-combine texts only on the next note rather than immediately on rests or skips.

   printPartCombineTexts (boolean)
      Set ‘Solo’ and ‘A due’ texts in the part combiner?

   soloIIText (markup)
      The text for the start of a solo for voice ‘two’ when part-combining.

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

   This engraver creates the following layout object(s): CombineTextScript (page 566).

Percent_repeat_engraver (page 485)
   Make whole measure repeats.
   Music types accepted: percent-event (page 56),
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 658), and PercentRepeatCounter (page 660).

**Phrasing_slur_engraver** (page 485)
Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 491.
Music types accepted: note-event (page 55), and phrasing-slur-event (page 56).
This engraver creates the following layout object(s): PhrasingSlur (page 661).

**Pitched_trill_engraver** (page 487)
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s): TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), and TrillPitchParentheses (page 723).

**Repeat_tie_engraver** (page 488)
Create repeat ties.
Music types accepted: repeat-tie-event (page 56),
This engraver creates the following layout object(s): RepeatTie (page 667), and RepeatTieColumn (page 668).

**Rest_engraver** (page 488)
Engrave rests.
Music types accepted: rest-event (page 57),
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 669).

**Rhythmic_column_engraver** (page 489)
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s): NoteColumn (page 651).

**Script_column_engraver** (page 489)
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 672).

**Script_engraver** (page 489)
Handle note scripted articulations.
Music types accepted: articulation-event (page 50),
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 670).

Slash_repeat_engraver (page 490)
Make beat repeats.
Music types accepted: repeat-slash-event (page 56),
This engraver creates the following layout object(s): DoubleRepeatSlash
(page 586), and RepeatSlash (page 666).

Slur_engraver (page 491)
Build slur grobs from slur events.
Music types accepted: note-event (page 55), and slur-event (page 57),
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 680).

Spanner_break_forbid_engraver (page 492)
Forbid breaks in certain spanners.

Stem_engraver (page 494)
Create stems, flags and single-stem tremolos. It also works together with the beam
engraver for overriding beaming.
Music types accepted: tremolo-event (page 60),
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 599), Stem
(page 693), StemStub (page 695), and StemTremolo (page 696).

Text_engraver (page 496)
Create text scripts.
Music types accepted: text-script-event (page 60),
This engraver creates the following layout object(s): TextScript (page 712).
Text_spanner_engraver (page 497)
Create text spanner from an event.
Music types accepted: text-span-event (page 60),
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 714).

Tie_engraver (page 497)
Generate ties between note heads of equal pitch.
Music types accepted: tie-event (page 60),
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 715), and TieColumn (page 717).

Trill_spanner_engraver (page 499)
Create trill spanners.
Music types accepted: trill-span-event (page 60),
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 724).

Tuplet_engraver (page 500)
Catch tuplet events and generate appropriate bracket.
Music types accepted: tuplet-span-event (page 60),
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 725), and TupletNumber (page 727).
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 305), and Voice (page 433).

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 305).

This context creates the following layout object(s): BarLine (page 532), BassFigure (page 538), BassFigureAlignment (page 538), BassFigureAlignmentPositioning (page 539), BassFigureBracket (page 540), BassFigureContinuation (page 541), BassFigureLine (page 541), BreathingSign (page 550), CaesuraScript (page 553), Clef (page 558), ClefModifier (page 561), CueClef (page 571), CueEndClef (page 574), DotColumn (page 581), FingeringColumn (page 599), InstrumentName (page 612), LedgerLineSpanner (page 624), NoteCollision (page 650), RestCollision (page 670), ScriptColumn (page 672), ScriptRow (page 672), SostenutoPedalLineSpanner (page 683), StaffEllipsis (page 687), StaffHighlight (page 690), StaffSpacing (page 691), StaffSymbol (page 691), SustainPedalLineSpanner (page 701), TimeSignature (page 718), UnaCordaPedalLineSpanner (page 730), and VerticalAxisGroup (page 732).

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 670), 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 120).

Context DrumStaff can contain CueVoice (page 100), DrumVoice (page 120), and NullVoice (page 245).

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

Alteration_glyph_engraver (page 445)
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 447)
   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 732).

Bar_engraver (page 447)
   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 49), caesura-event (page 51),
   coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52),
   section-event (page 57), and segno-mark-event (page 57).
Properties (read)

caesuraType (list)
   An alist
      ((bar-line . bar-type)
       (breath . breath-type)
       (scripts . script-type...)n
       (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 at-
   tached 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 ‘:|.’.

doubleRepeatSegnoBarType (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 ‘|.|’.

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 #t, Bar_engraver forbids line breaks where there is no bar line.

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

printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning of the piece.

printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 532).

Caesura_engraver (page 454)
    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 51),

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 at-
   tached 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 en-
   graver 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 550),
and CaesuraScript (page 553).

Clef_engraver (page 456)
   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 to a clef. Values of 7 and -7 are com-
   mon.

clefTranspositionStyle (symbol)
   Determines the way the ClefModifier grob of a clef is displayed. Possible
   values are 'default, 'parenthesized, and 'bracketed.

clefTranspositionStyle (symbol)
   '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 558), and ClefModifier (page 561).

Collision_engraver (page 457)
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 650).

Cue_clef_engraver (page 459)
Determine and set reference point for pitches in cued voices.

Properties (read)

  clefTransposition (integer)
  Add this much extra transposition to a clef. 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 to a cue clef. Values of 7 and -7 are common.

  cueClefTranspositionStyle (symbol)
  Determines the way the ClefModifier grob of a cue clef 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 561), CueClef (page 571), and CueEndClef (page 574).
Dot_column_engraver (page 461)
  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 581).

Figured_bass_engraver (page 465)
  Make figured bass numbers.
  Music types accepted: bass-figure-event (page 50), and rest-event (page 57),
  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 exten-
      der lines.
    useBassFigureExtenders (boolean)
      Whether to use extender lines for repeated bass figures.
  This engraver creates the following layout object(s): BassFigure (page 538),
  BassFigureAlignment (page 538), BassFigureBracket (page 540),
  BassFigureContinuation (page 541), and BassFigureLine (page 541).

Figured_bass_position_engraver (page 466)
  Position figured bass alignments over notes.
  This engraver creates the following layout object(s):
  BassFigureAlignmentPositioning (page 539).

Fingering_column_engraver (page 466)
  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 599).

Font_size_engraver (page 466)
  Put fontSize into font-size grob property.
  Properties (read)
    fontSize (number)
      The relative size of all grobs in a context.

Grob_pq_engraver (page 470)
  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)

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

Instrument_name_engraver (page 471)
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 612).

Ledger_line_engraver (page 475)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): LedgerLineSpanner (page 624).

Merge_mmrest_numbers_engraver (page 479)
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 481)
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 672).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Piano_pedal_align_engraver (page 486)
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 683), SustainPedalLineSpanner (page 701), and UnaCordaPedalLineSpanner (page 730).

**Pure_from_neighbor_engraver** (page 487)
Coordinates items that get their pure heights from their neighbors.

**Rest_collision_engraver** (page 488)
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 670).

**Script_row_engraver** (page 489)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 672).

**Separating_line_group_engraver** (page 489)
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 691).

**Skip_typesetting_engraver** (page 490)
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 687).

**Staff_collecting_engraver** (page 492)
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 493)
Highlights music passages.

Music types accepted: staff-highlight-event (page 58),
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 690).

Staff_symbol_engraver (page 493)
  Create the constellation of five (default) staff lines.
  Music types accepted: staff-span-event (page 58),
  This engraver creates the following layout object(s): StaffSymbol (page 691).

Time_signature_engraver (page 498)
  Create a Section 3.1.147 [TimeSignature], page 718, whenever timeSignatureFraction changes.
  Music types accepted: time-signature-event (page 60),
  Properties (read)

  initialTimeSignatureVisibility (vector)
  break visibility for the initial time signature.

  partialBusy (boolean)
  Signal that \partial acts at the current timestep.

  timeSignatureFraction (positive, finite 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 718).

2.1.8 DrumVoice
A voice on a percussion staff.

  This context also accepts commands for the following context(s): Voice (page 433).
  This context creates the following layout object(s): Beam (page 542), BendAfter (page 545), BreathingSign (page 550), CombineTextScript (page 566), Dots (page 582), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner (page 592), FingerGlideSpanner (page 595), Flag (page 599), Hairpin (page 607), InstrumentSwitch (page 613), LaissezVibrerTier (page 623), LaissezVibrerTieColumn (page 624), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestText (page 646), MultiMeasureRestText (page 647), NoteColumn (page 651), NoteHead (page 652), NoteSpacing (page 654), PercentRepeat (page 658), PercentRepeatCounter (page 660), PhrasingSlur (page 661), RepeatSlash (page 666), RepeatTie (page 667), RepeatTieColumn (page 668), Rest (page 669), Script (page 670), ScriptColumn (page 672), Slur (page 680), Stem (page 693), StemStub (page 695), StemTremolo (page 696), TextScript (page 712), TextSpanner (page 714), Tie (page 715), TieColumn (page 717), TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), TrillPitchParentheses (page 723), TrillSpanner (page 724), TupletBracket (page 725), and TupletNumber (page 727).

  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 446)
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 494, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 51),

Properties (read)

autoBeaming (boolean)
If set to #t then beams are generated automatically. If set to #f, auto-beaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.

baseMoment (positive moment with no grace part)
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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Beam_engraver (page 451)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

Properties (read)

baseMoment (positive moment with no grace part)
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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).
Bend_engraver (page 453)
Create fall spanners.
Music types accepted: bend-after-event (page 51),
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 545).

Breathing_sign_engraver (page 454)
Notate breath marks.
Music types accepted: breathing-event (page 51),
Properties (read)
  breathMarkType (symbol)
  The type of BreathingSign to create at \breathe.
This engraver creates the following layout object(s): BreathingSign (page 550).

Chord_tremolo_engraver (page 456)
Generate beams for tremolo repeats.
Music types accepted: tremolo-span-event (page 60),
This engraver creates the following layout object(s): Beam (page 542).

Dots_engraver (page 462)
Create Section 3.1.43 [Dots], page 582, objects for Section 3.2.119
[rhythmic-head-interface], page 801s.
This engraver creates the following layout object(s): Dots (page 582).

Double_percent_repeat_engraver (page 462)
Make double measure repeats.
Music types accepted: double-percent-event (page 52),
Properties (read)
  countPercentRepeats (boolean)
    If set, produce counters for percent repeats.
  measureLength (positive moment with no grace part)
    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 re-
    quested by the user.
This engraver creates the following layout object(s): DoublePercentRepeat (page 583), and DoublePercentRepeatCounter (page 584).

Drum_notes_engraver (page 462)
Generate drum note heads.
Music types accepted: note-event (page 55),
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 652), and Script (page 670).

Dynamic_align_engraver (page 463)
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 589).

Dynamic_engraver (page 464)
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted: absolute-dynamic-event (page 49),
break-dynamic-span-event (page 51), and span-dynamic-event (page 58),
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 590),
DynamicTextSpanner (page 592), and Hairpin (page 607).
Finger_glide_engraver (page 466)
   Engraver to print a line between two Fingering grobs.
Music types accepted: note-event (page 55),
This engraver creates the following layout object(s): FingerGlideSpanner (page 595).

Font_size_engraver (page 466)
   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 467)
   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 468)
   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 51),
Properties (read)
   autoBeaming (boolean)
      If set to #t then beams are generated automatically. If set to #f, autobeaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.

This engraver creates the following layout object(s): Beam (page 542).

Grace_beam_engraver (page 469)
   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 50),
Properties (read)
   baseMoment (positive moment with no grace part)
      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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Grace_engraver (page 469)
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 470)
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 472)
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 613).

Laissez_vibrer_engraver (page 475)
Create laissez vibrer items.
Music types accepted: laissez-vibrer-event (page 53),
This engraver creates the following layout object(s): LaissezVibrerTie (page 623), and LaissezVibrerTieColumn (page 624).

Multi_measure_rest_engraver (page 480)
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 642.
Music types accepted: multi-measure-articulation-event (page 54), multi-measure-rest-event (page 54), and multi-measure-text-event (page 54),
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 bar number. 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 642),
MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), and
MultiMeasureRestText (page 647).

Note_spacing_engraver (page 483)
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s): NoteSpacing (page 654).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Part_combine_engraver (page 485)
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and
‘unisono’.
Music types accepted: note-event (page 55), and part-combine-event (page 56),

Properties (read)

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

partCombineTextsOnNote (boolean)
Print part-combine texts only on the next note rather than immediately
on rests or skips.

printPartCombineTexts (boolean)
Set ‘Solo’ and ‘A due’ texts in the part combiner?

soloIIText (markup)
The text for the start of a solo for voice ‘two’ when part-combining.

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

This engraver creates the following layout object(s): CombineTextScript
(page 566).

Percent_repeat_engraver (page 485)
Make whole measure repeats.
Music types accepted: percent-event (page 56),

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 658), and PercentRepeatCounter (page 660).

Phrasing_slur_engraver (page 485)

Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 491.

Music types accepted: note-event (page 55), and phrasing-slur-event (page 56),

This engraver creates the following layout object(s): PhrasingSlur (page 661).

Pitched_trill_engraver (page 487)

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

This engraver creates the following layout object(s): TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), and TrillPitchParentheses (page 723).

Repeat_tie_engraver (page 488)

Create repeat ties.

Music types accepted: repeat-tie-event (page 56),

This engraver creates the following layout object(s): RepeatTie (page 667), and RepeatTieColumn (page 668).

Rest_engraver (page 488)

Engrave rests.

Music types accepted: rest-event (page 57),

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 669).

Rhythmic_column_engraver (page 489)

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

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

Script_column_engraver (page 489)

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 672).

Script_engraver (page 489)

Handle note scripted articulations.

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

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 670).

**Slash_repeat_engraver** (page 490)

Make beat repeats.

Music types accepted: repeat-slash-event (page 56).

This engraver creates the following layout object(s): DoubleRepeatSlash (page 586), and RepeatSlash (page 666).

**Slur_engraver** (page 491)

Build slur grobs from slur events.

Music types accepted: note-event (page 55), and slur-event (page 57).

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 680).

**Spanner_break_forbid_engraver** (page 492)

Forbid breaks in certain spanners.

**Stem_engraver** (page 494)

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

Music types accepted: tremolo-event (page 60).

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 599), Stem (page 693), StemStub (page 695), and StemTremolo (page 696).

**Text_engraver** (page 496)

Create text scripts.

Music types accepted: text-script-event (page 60).

This engraver creates the following layout object(s): TextScript (page 712).

**Text_spanner_engraver** (page 497)

Create text spanner from an event.

Music types accepted: text-span-event (page 60).

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 714).

Tie_engraver (page 497)
Generate ties between note heads of equal pitch.
Music types accepted: tie-event (page 60),
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 715), and TieColumn (page 717).

Trill_spanner_engraver (page 499)
Create trill spanners.
Music types accepted: trill-span-event (page 60),
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 724).

Tuplet_engraver (page 500)
Catch tuplet events and generate appropriate bracket.
Music types accepted: tuplet-span-event (page 60),
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 725), and TupletNumber (page 727).

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 305), and Voice (page 433).
This context creates the following layout object(s): BarLine (page 532),
DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner (page 592), Hairpin (page 607), PianoPedalBracket (page 663), Script (page 670), SostenutoPedal (page 682), SustainPedal (page 700), TextScript (page 712), TextSpanner (page 714), UnaCordaPedal (page 728), and VerticalAxisGroup (page 732).

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 712), to ‘italic.
- Set grob property nonstaff-relatedstaff-spacing in VerticalAxisGroup (page 732), to:
  '((basic-distance . 5) (padding . 0.5))
- Set grob property outside-staff-priority in DynamicLineSpanner (page 589), to #f.
- Set grob property outside-staff-priority in DynamicText (page 590), to #f.
- Set grob property staff-affinity in VerticalAxisGroup (page 732), to 0.
- Set grob property Y-offset in DynamicLineSpanner (page 589), 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 447)
  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 732).

- **Bar_engraver** (page 447)
  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 49), caesura-event (page 51), coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52), section-event (page 57), and segno-mark-event (page 57),
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.|:’.

derRepeatBarType (string)
Bar line to insert at the end of a \repeat volta. The default is ‘:|.’.

derRepeatSegnoBarType (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 #t, Bar_engraver forbids line breaks where there is no bar line.
measureBarType (string)
Bar line to insert at a measure boundary.

printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning of the piece.

printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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.
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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 re-
    quested by the user.

This engraver creates the following layout object(s): BarLine (page 532).

Dynamic_align_engraver (page 463)
  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 589).

Dynamic_engraver (page 464)
  Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: absolute-dynamic-event (page 49),
break-dynamic-span-event (page 51), and span-dynamic-event
(page 58),

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 590),
DynamicTextSpanner (page 592), and Hairpin (page 607).

Font_size_engraver (page 466)
  Put fontSize into font-size grob property.

Properties (read)

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

Output_property_engraver (page 483)
  Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 50),
Piano_pedal_engraver (page 486)
Engrave piano pedal symbols and brackets.
Music types accepted: sostenuto-event (page 58), sustain-event (page 59), and una-corda-event (page 60),
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 \textit{(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 663), SostenutoPedal (page 682), SustainPedal (page 700), and UnaCordaPedal (page 728).

Script_engraver (page 489)
Handle note scripted articulations.
Music types accepted: articulation-event (page 50),
Properties (read)

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

This engraver creates the following layout object(s): Script (page 670).

Text_engraver (page 496)
Create text scripts.
Music types accepted: text-script-event (page 60),
This engraver creates the following layout object(s): TextScript (page 712).

Text_spanner_engraver (page 497)
Create text spanner from an event.
Music types accepted: text-span-event (page 60),
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 714).

2.1.10 FiguredBass

A context for printing a figured bass line.

This context creates the following layout object(s): BassFigure (page 538), BassFigureAlignment (page 538), BassFigureBracket (page 540), BassFigureContinuation (page 541), BassFigureLine (page 541), StaffSpacing (page 691), and VerticalAxisGroup (page 732).

This context sets the following properties:

- Set grob property nonstaff-nonstaff-spacing.padding in VerticalAxisGroup (page 732), to 0.5.
- Set grob property nonstaff-relatedstaff-spacing.padding in VerticalAxisGroup (page 732), to 0.5.
- Set grob property remove-empty in VerticalAxisGroup (page 732), to #t.
- Set grob property remove-first in VerticalAxisGroup (page 732), to #t.
- Set grob property staff-affinity in VerticalAxisGroup (page 732), 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 447)
  - 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.

- **Figured_bass_engraver** (page 465)
  - Make figured bass numbers.
  - Music types accepted: bass-figure-event (page 50), and rest-event (page 57).
  - 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.
A routine generating a markup for a bass figure.

Don’t swallow rest events.

A list of bass figures that are not printed as numbers, but only as extender lines.

Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): BassFigure (page 538), BassFigureAlignment (page 538), BassFigureBracket (page 540), BassFigureContinuation (page 541), and BassFigureLine (page 541).

Generate objects for computing spacing parameters.

Should be set for staves.

True if currentCommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s): StaffSpacing (page 691).

A context for displaying fret diagrams.

This context also accepts commands for the following context(s): Staff (page 305).

This context creates the following layout object(s): FretBoard (page 601), InstrumentName (page 612), StaffSpacing (page 691), and VerticalAxisGroup (page 732).

This context sets the following properties:

Set context property handleNegativeFrets to ’recalculate.

Set context property instrumentName to ’().

Set context property predefinedDiagramTable to #<hash-table>.

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):

Group all objects created in this context in a VerticalAxisGroup spanner.

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

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 732).

Font_size_engraver (page 466)
Put fontSize into font-size grob property.

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

Fretboard_engraver (page 467)
Generate fret diagram from one or more events of type NoteEvent.
Music types accepted: fingering-event (page 53), note-event (page 55), and string-number-event (page 59),

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 601).

Instrument_name_engraver (page 471)
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 612).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Separating_line_group_engraver (page 489)
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 691).

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 281).

Context Global can contain ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

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 529), InstrumentName (page 612), SpanBar (page 685), SpanBarStub (page 686), StaffGrouper (page 689),
SystemStartBar (page 704), SystemStartBrace (page 705), SystemStartBracket (page 706), SystemStartSquare (page 707), and VerticalAlignment (page 732).

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 590), to #f.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Staff (page 305).

Context GrandStaff can contain ChoirStaff (page 68), ChordNames (page 98), Devnull (page 111), DrumStaff (page 111), Dynamics (page 129), FiguredBass (page 135), FretBoards (page 136), GrandStaff (page 138), GregorianTranscriptionLyrics (page 140), GregorianTranscriptionStaff (page 143), KievanStaff (page 193), Lyrics (page 216), MensuralStaff (page 219), NoteNames (page 243), OneStaff (page 247), PetrucciStaff (page 248), PianoStaff (page 273), RhythmicStaff (page 275), Staff (page 305), StaffGroup (page 318), TabStaff (page 360), VaticanaLyrics (page 383), and VaticanaStaff (page 409).

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

Instrument_name_engraver (page 471)

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 612).

Output_property_engraver (page 483)

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 50),
Span_arpeggio_engraver (page 492)
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 529).

Span_bar_engraver (page 492)
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 685).

Span_bar_stub_engraver (page 492)
Make stubs for span bars in all contexts that the span bars cross.

This engraver creates the following layout object(s): SpanBarStub (page 686).

System_start_delimiter_engraver (page 494)
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 704), SystemStartBrace (page 705), SystemStartBracket (page 706), and SystemStartSquare (page 707).

Vertical_align_engraver (page 500)
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 689), and VerticalAlignment (page 732).

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 216).

This context creates the following layout object(s): InstrumentName (page 612), LyricExtender (page 629), LyricHyphen (page 629), LyricRepeatCount (page 631),
LyricSpace (page 633), LyricText (page 633), StanzaNumber (page 692), VerticalAxisGroup (page 732), and VowelTransition (page 738).

This context sets the following properties:
- Set context property instrumentName to '().
- Set context property lyricRepeatCountFormatter to #<procedure at lily/translation-functions.scm:208:4 (context repeat-count)>.
- Set context property searchForVoice to #f.
- Set context property shortInstrumentName to '().
- Set grob property bar-extent in BarLine (page 532), to: '
  (-0.05 . 0.05)
- Set grob property font-size in InstrumentName (page 612), to 1.0.
- Set grob property nonstaff-nonstaff-spacing in VerticalAxisGroup (page 732), to:
  '((basic-distance . 0)
   (minimum-distance . 2.8)
   (padding . 0.2)
   (stretchability . 0))
- Set grob property nonstaff-relatedstaff-spacing in VerticalAxisGroup (page 732), to:
  '((basic-distance . 5.5)
   (padding . 0.5)
   (stretchability . 1))
- Set grob property nonstaff-unrelatedstaff-spacing.padding in VerticalAxisGroup (page 732), to 1.5.
- Set grob property parent-alignment-X in LyricRepeatCount (page 631), to 1.
- Set grob property remove-empty in VerticalAxisGroup (page 732), to #t.
- Set grob property remove-first in VerticalAxisGroup (page 732), to #t.
- Set grob property self-alignment-Y in InstrumentName (page 612), to #f.
- Set grob property short-bar-extent in BarLine (page 532), to:
  '(-0.05 . 0.05)
- Set grob property staff-affinity in VerticalAxisGroup (page 732), 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 447)
  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 732).

Extender_engraver (page 465)
Create lyric extenders.
Music types accepted: completize-extender-event (page 52), and extender-event (page 52),
Properties (read)

extendersOverRests (boolean)
Whether to continue extenders as they cross a rest.

This engraver creates the following layout object(s): LyricExtender (page 629).

Font_size_engraver (page 466)
Put fontSize into font-size grob property.
Properties (read)

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

Hyphen_engraver (page 471)
Create lyric hyphens, vowel transitions and distance constraints between words.
Music types accepted: hyphen-event (page 53), and vowel-transition-event (page 61),
This engraver creates the following layout object(s): LyricHyphen (page 629), LyricSpace (page 633), and VowelTransition (page 738).

Instrument_name_engraver (page 471)
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 612).

Lyric_engraver (page 475)
Engrave text for lyrics.
Music types accepted: **lyric-event** (page 54),

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 633).

**Lyric_repeat_count_engraver** (page 476)

Create repeat counts within lyrics for modern transcriptions of Gregorian chant.

Music types accepted: **volta-repeat-end-event** (page 61),

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 631).

**Pure_from_neighbor_engraver** (page 487)

Coordinates items that get their pure heights from their neighbors.

**Stanza_number_engraver** (page 494)

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 692).

### 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 305).

This context creates the following layout object(s): **Accidental** (page 520), **AccidentalCautionary** (page 521), **AccidentalPlacement** (page 522), **AccidentalSuggestion** (page 523), **BarLine** (page 532), **BassFigure** (page 538), **BassFigureAlignment** (page 538), **BassFigureAlignmentPositioning** (page 539), **BassFigureBracket** (page 540), **BassFigureContinuation** (page 541), **BassFigureLine** (page 541), **Clef** (page 558), **ClefModifier** (page 561), **CueClef** (page 571), **CueEndClef** (page 574), **Divisio** (page 578), **DotColumn** (page 581), **FingeringColumn** (page 599), **InstrumentName** (page 612), **KeyCancellation** (page 616), **KeySignature** (page 619), **LedgerLineSpanner** (page 624), **NoteCollision** (page 650), **OttavaBracket** (page 655), **PianoPedalBracket** (page 663), **RestCollision** (page 670), **ScriptColumn** (page 672), **ScriptRow** (page 672), **SostenutoPedal** (page 682), **SostenutoPedalLineSpanner** (page 683), **StaffEllipsis** (page 687), **StaffHighlight** (page 690), **StaffSpacing** (page 691), **StaffSymbol** (page 691), **SustainPedal** (page 700), **SustainPedalLineSpanner** (page 701),
This context sets the following properties:

- Set context property `autoAccidentals` to:
  `'((Staff #<procedure at lily/music-functions.scm:1716:0 (context pitch barnum)>)

- 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 `printTrivialVoltaRepeats` to `#t`.

- 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 "S-||".

- Set grob property `extra-spacing-height` in BreathingSign (page 550), to:
  `item::extra-spacing-height-including-staff`.

- Set grob property `extra-spacing-width` in BreathingSign (page 550), 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 156).

Context GregorianTranscriptionStaff can contain CueVoice (page 100), GregorianTranscriptionVoice (page 156), and NullVoice (page 245).

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

Accidental_engraver (page 443)

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 bar number. 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 520),
AccidentalCautionary (page 521), AccidentalPlacement (page 522), and
AccidentalSuggestion (page 523).

Alteration_glyph_engraver (page 445)
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 447)
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 732).
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Bar_ engraver (page 447)
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 49), caesura-event (page 51),
coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52),
section-event (page 57), and segno-mark-event (page 57),

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 #t, Bar_engraver forbids line breaks where there is no bar line.

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

printInitialRepeatBar (boolean)
   Use a special bar line at the start of a volta repeat even at the beginning
   of the piece.

printTrivialVoltaRepeats (boolean)
   Notate volta-style repeats even when the repeat count is 1.

repeatCommands (list)
   A list of commands related to volta-style repeats. In general, each ele-
   ment 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 return-count
      End a repeated section. return-count is the number of times to go
      back from this point to the beginning of the section.

   start-repeat repeat-count
      Start a repeated section. repeat-count is the number of times to
      perform this 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 532).

Clef_engraver (page 456)
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 to a clef. Values of 7 and -7 are common.

clefTranspositionStyle (symbol)
Determines the way the ClefModifier grob of a clef 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 558), and ClefModifier (page 561).

Collision_engraver (page 457)
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 650).

Cue_clef_engraver (page 459)
Determine and set reference point for pitches in cued voices.
Properties (read)

`clefTransposition` (integer)
Add this much extra transposition to a clef. 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 to a cue clef. Values of 7 and -7 are common.

`cueClefTranspositionStyle` (symbol)
Determines the way the `ClefModifier` grob of a cue clef 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 561), `CueClef` (page 571), and `CueEndClef` (page 574).

`Divisio_engraver` (page 461)
Create divisiones: chant notation for points of breathing or caesura.

Music types accepted: `caesura-event` (page 51), `fine-event` (page 52), `section-event` (page 57), `volta-repeat-end-event` (page 61), and `volta-repeat-start-event` (page 61),

Properties (read)

`caesuraType` (list)
An alist

```lisp
((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 (articularions . 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 578).

Dot_column_engraver (page 461)

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 581).

Figured_bass_engraver (page 465)

Make figured bass numbers.

Music types accepted: bass-figure-event (page 50), and rest-event (page 57).

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 538), BassFigureAlignment (page 538), BassFigureBracket (page 540), BassFigureContinuation (page 541), and BassFigureLine (page 541).

Figured_bass_position_engraver (page 466)

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

BassFigureAlignmentPositioning (page 539).

Fingering_column_engraver (page 466)

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 599).

Font_size_engraver (page 466)
Put fontSize into font-size grob property.
Properties (read)
  fontSize (number)
    The relative size of all grobs in a context.

Grob_pq_engraver (page 470)
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)
  busyGrosbs (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)
  busyGrosbs (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 471)
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 612).

Key_engraver (page 473)
Engrave a key signature.
Music types accepted: key-change-event (page 53),
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 re-
quested 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 616),
and KeySignature (page 619).

Ledger_line_engraver (page 475)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s): LedgerLineSpanner
(page 624).

Merge_mmrest_numbers_engraver (page 479)
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 481)
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 672).

Ottava_spanner_engraver (page 483)
Create a text spanner when the ottavation property changes.
Music types accepted: ottava-event (page 55),
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 655).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),
Piano_pedal_align_engraver (page 486)
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 683), SustainPedallineSpanner (page 701), and UnaCordaPedallineSpanner (page 730).
Piano_pedal_engraver (page 486)
Engrave piano pedal symbols and brackets.
Music types accepted: sostenuto-event (page 58), sustain-event (page 59), and una-corda-event (page 60),
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 663), SostenutoPedal (page 682), SustainPedal (page 700), and UnaCordaPedal (page 728).

Pure_from_neighbor_engraver (page 487)
Coordinates items that get their pure heights from their neighbors.

Rest_collision_engraver (page 488)
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 670).

Script_row_engraver (page 489)
Determine order in horizontal side position elements.
This engraver creates the following layout object(s): ScriptRow (page 672).

Separating_line_group_engraver (page 489)
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 691).

Skip_typesetting_engraver (page 490)
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 687).

Staff_collecting_engraver (page 492)
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 493)

Highlights music passages.

Music types accepted: staff-highlight-event (page 58),

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 690).

Staff_symbol_ engraver (page 493)

Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): StaffSymbol (page 691).

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 433).

This context creates the following layout object(s): Arpeggio (page 529), Beam (page 542), BendAfter (page 545), BreathingSign (page 550), ClusterSpanner (page 563), ClusterSpannerBeacon (page 564), CombineTextScript (page 566), Dots (page 582), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner (page 592), Episema (page 594), FingerGlideSpanner (page 595), Fingering (page 597), Glissando (page 603), Hairpin (page 607), InstrumentSwitch (page 613), LaissezVibrerTie (page 623), LaissezVibrerTieColumn (page 624), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), NoteColumn (page 651), NoteHead (page 652), NoteSpacing (page 654), PercentRepeat (page 658), PercentRepeatCounter (page 660), PhrasingSlur (page 661), RepeatSlash (page 666), RepeatTie (page 667), RepeatTieColumn (page 668), Rest (page 669), Script (page 670), ScriptColumn (page 672), Slur (page 680), StringNumber (page 697), StrokeFinger (page 699), TextScript (page 712), TextSpanner (page 714), Tie (page 715), TieColumn (page 717), TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), TrillPitchParentheses (page 723), TrillSpanner (page 724), TupletBracket (page 725), TupletNumber (page 727), and VoiceFollower (page 734).

This context sets the following properties:

• Set context property autoBeaming to #f.

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

This context cannot contain other contexts.

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

Arpeggio_ engraver (page 446)

Generate an Arpeggio symbol.
Music types accepted: arpeggio-event (page 50),
This engraver creates the following layout object(s): Arpeggio (page 529).

Auto_beam_engraver (page 446)
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 494, properties stemLeftBeamCount and stemRightBeamCount.
Music types accepted: beam-forbid-event (page 51),

Properties (read)

autoBeaming (boolean)
  If set to #t then beams are generated automatically. If set to #f, auto-
  beaming is switched off as soon as the current beam (if any) is finished
  according to the auto-beaming rules.

baseMoment (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number
  of beamlets, dependent on maxSubdivideInterval, between beats at
  multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Beam_engraver (page 451)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags
instead of beams.
Music types accepted: beam-event (page 50),

Properties (read)

baseMoment (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number
  of beamlets, dependent on maxSubdivideInterval, between beats at
  multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).
Bend_engraver (page 453)
Create fall spanners.
Music types accepted: bend-after-event (page 51),
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 545).

Breathing_sign_engraver (page 454)
Notate breath marks.
Music types accepted: breathing-event (page 51),
Properties (read)

breathMarkType (symbol)
The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 550).

Chord_tremolo_engraver (page 456)
Generate beams for tremolo repeats.
Music types accepted: tremolo-span-event (page 60),
This engraver creates the following layout object(s): Beam (page 542).

Cluster_spanner_engraver (page 457)
Engrave a cluster using Spanner notation.
Music types accepted: cluster-note-event (page 51),
This engraver creates the following layout object(s): ClusterSpanner (page 563),
and ClusterSpannerBeacon (page 564).

Dots_engraver (page 462)
Create Section 3.1.43 [Dots], page 582, objects for Section 3.2.119
[rhythmic-head-interface], page 801s.
This engraver creates the following layout object(s): Dots (page 582).

Double_percent_repeat_engraver (page 462)
Make double measure repeats.
Music types accepted: double-percent-event (page 52),
Properties (read)

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

measureLength (positive moment with no grace part)
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 583), and DoublePercentRepeatCounter (page 584).

Dynamic_align_engraver (page 463)
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 589).

Dynamic_engraver (page 464)
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted: absolute-dynamic-event (page 49), break-dynamic-span-event (page 51), and span-dynamic-event (page 58).
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 590), DynamicTextSpanner (page 592), and Hairpin (page 607).

Episema_engraver (page 465)
Create an Editio Vaticana-style episema line.
Music types accepted: episema-event (page 52),
This engraver creates the following layout object(s): Episema (page 594).
Finger_glide_engraver (page 466)
   Engraver to print a line between two Fingering grobs.
   Music types accepted: note-event (page 55),
   This engraver creates the following layout object(s): FingerGlideSpanner
   (page 595).

Fingering_engraver (page 466)
   Create fingering scripts.
   Music types accepted: fingering-event (page 53),
   This engraver creates the following layout object(s): Fingering (page 597).

Font_size_engraver (page 466)
   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 467)
   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 re-
         quested by the user.

Glissando_engraver (page 468)
   Engrave glissandi.
   Music types accepted: glissando-event (page 53),
   Properties (read)
      glissandoMap (list)
         A map in the form of '((source1 . target1) (source2 . target2) (sourcecn
         targetcn)) 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 num-
         ber of note-heads in the two note columns between which the glissandi
         occur.
   This engraver creates the following layout object(s): Glissando (page 603).

Grace_auto_beam_engraver (page 468)
   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 51),
   Properties (read)
      autoBeaming (boolean)
         If set to #t then beams are generated automatically. If set to #f, auto-
         beamng is switched off as soon as the current beam (if any) is finished
         according to the auto-beaming rules.
This engraver creates the following layout object(s): Beam (page 542).

**Grace_beam_engraver** (page 469)
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 50),

Properties (read)

- **baseMoment** (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `maxSubdivideInterval`, between beats at multiples of `minSubdivideInterval`.

This engraver creates the following layout object(s): Beam (page 542).

**Grace_engraver** (page 469)
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 470)
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 472)
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 613).
Laissez_vibrer_engraver (page 475)
Create laissez vibrer items.
Music types accepted: laissez-vibrer-event (page 53),
This engraver creates the following layout object(s): LaissezVibrerTie (page 623), and LaissezVibrerTieColumn (page 624).

Multi_measure_rest_engraver (page 480)
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 642.
Music types accepted: multi-measure-articulation-event (page 54), multi-measure-rest-event (page 54), and multi-measure-text-event (page 54),
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 bar number. 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 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), and MultiMeasureRestText (page 647).

New_fingering_engraver (page 481)
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 597), Script (page 670), StringNumber (page 697), and StrokeFinger (page 699).

Note_head_line_engraver (page 482)
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): \textit{VoiceFollower} (page 734).

\textbf{Note_heads_engraver} (page 482)
Generate note heads.

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

Properties (read)

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

\texttt{staffLineLayoutFunction} (procedure)
\begin{itemize}
  \item Layout of staff lines, traditional, or semitone.
\end{itemize}

This engraver creates the following layout object(s): \textit{NoteHead} (page 652).

\textbf{Note_spacing_engraver} (page 483)
Generate \texttt{NoteSpacing}, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s): \textit{NoteSpacing} (page 654).

\textbf{Output_property_engraver} (page 483)
Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 50),

\textbf{Part_combine_engraver} (page 485)
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted: note-event (page 55), and part-combine-event (page 56),

Properties (read)

\texttt{aDueText} (markup)
\begin{itemize}
  \item Text to print at a unisono passage.
\end{itemize}

\texttt{partCombineTextsOnNote} (boolean)
\begin{itemize}
  \item Print part-combine texts only on the next note rather than immediately on rests or skips.
\end{itemize}

\texttt{printPartCombineTexts} (boolean)
\begin{itemize}
  \item Set ‘Solo’ and ‘A due’ texts in the part combiner?
\end{itemize}

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

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

This engraver creates the following layout object(s): \textit{CombineTextScript} (page 566).

\textbf{Percent_repeat_engraver} (page 485)
Make whole measure repeats.

Music types accepted: percent-event (page 56),

Properties (read)

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

\texttt{currentCommandColumn} (graphical (layout) object)
\begin{itemize}
  \item 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 658), and PercentRepeatCounter (page 660).

Phrasing_slur_engraver (page 485)

Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 491.

Music types accepted: note-event (page 55), and phrasing-slur-event (page 56),

This engraver creates the following layout object(s): PhrasingSlur (page 661).

Pitched_trill_engraver (page 487)

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

This engraver creates the following layout object(s): TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), and TrillPitchParentheses (page 723).

Repeat_tie_engraver (page 488)

Create repeat ties.

Music types accepted: repeat-tie-event (page 56),

This engraver creates the following layout object(s): RepeatTie (page 667), and RepeatTieColumn (page 668).

Rest_engraver (page 488)

Engrave rests.

Music types accepted: rest-event (page 57),

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 669).

Rhythmic_column_engraver (page 489)

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

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

Script_column_engraver (page 489)

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 672).

Script_engraver (page 489)

Handle note scripted articulations.

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

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 670).

**Slash_repeat_engraver** (page 490)
Make beat repeats.
Music types accepted: repeat-slash-event (page 56),
This engraver creates the following layout object(s): DoubleRepeatSlash (page 586), and RepeatSlash (page 666).

**Slur_engraver** (page 491)
Build slur grobs from slur events.
Music types accepted: note-event (page 55), and slur-event (page 57),
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 680).

**Spanner_break_forbid_engraver** (page 492)
Forbid breaks in certain spanners.

**Text_engraver** (page 496)
Create text scripts.
Music types accepted: text-script-event (page 60),
This engraver creates the following layout object(s): TextScript (page 712).

**Text_spanner_engraver** (page 497)
Create text spanner from an event.
Music types accepted: text-span-event (page 60),
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 714).

**Tie_engraver** (page 497)
Generate ties between note heads of equal pitch.
Music types accepted: tie-event (page 60),
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 715), and TieColumn (page 717).

Trill_spanner_engraver (page 499)
Create trill spanners.
Music types accepted: trill-span-event (page 60),
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 724).

Tuplet_engraver (page 500)
Catch tuplet events and generate appropriate bracket.
Music types accepted: tuplet-span-event (page 60),
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 725), and TupletNumber (page 727).

2.1.17 InternalGregorianStaff
A kind of Staff with settings shared by multiple variants of Gregorian chant notation.

This context creates the following layout object(s): Accidental (page 520), AccidentalCautionary (page 521), AccidentalPlacement (page 522), AccidentalSuggestion (page 523), BarLine (page 532), BassFigure (page 538), BassFigureAlignment (page 538), BassFigureAlignmentPositioning (page 539), BassFigureBracket (page 540), BassFigureContinuation (page 541), BassFigureLine (page 541), Clef (page 558), ClefModifier (page 561), CueClef (page 571), CueEndClef (page 574), Divisio (page 578), DotColumn (page 581), FingeringColumn (page 599), InstrumentName (page 612), KeyCancellation (page 616), KeySignature (page 619), LedgerLineSpanner (page 624), NoteCollision (page 650), OttavaBracket (page 655), PianoPedalBracket (page 663), RestCollision (page 670), ScriptColumn (page 672), ScriptRow (page 672), SostenutoPedal (page 682), SostenutoPedalLineSpanner (page 683), StaffEllipsis (page 687), StaffHighlight (page 690), StaffSpacing (page 691), StaffSymbol (page 691), SustainPedal (page 700), SustainPedalLineSpanner (page 701), TimeSignature (page 718), UnaCordaPedal (page 728), UnaCordaPedalLineSpanner (page 730), and VerticalAxisGroup (page 732).

This context sets the following properties:
• Set context property autoAccidentals to:
  '(Staff #eprocedure at lily/music-functions.scm:1716:0 (context pitch barnum))'
• 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 printTrivialVoltaRepeats to #t.
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 550), to item::extra-spacing-height-including-staff.
Set grob property extra-spacing-width in BreathingSign (page 550), to: '(-1.0 . 0.0)

This is a ‘Bottom’ context; no contexts will be created implicitly from it.
Context InternalGregorianStaff can contain CueVoice (page 100), and NullVoice (page 245).

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

Accidental_engraver (page 443)
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 bar number. 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 520), AccidentalCautionary (page 521), AccidentalPlacement (page 522), and AccidentalSuggestion (page 523).

Alteration_glyph_engraver (page 445)
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)
A list 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 447)
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 732).

Bar_engraver (page 447)
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 49), caesura-event (page 51), coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52), section-event (page 57), and segno-mark-event (page 57).

Properties (read)

caesuraType (list)
An alist

((bar-line . bar-type)
specifying which breath mark, bar line, and scripts to create at \texttt{\textbackslash caesura}. All entries are optional.

\texttt{bar-line} has higher priority than a measure bar line and \texttt{underlying-bar-line} has lower priority than a measure bar line.

\texttt{caesuraTypeTransform} \texttt{(procedure)}

An engraver callback taking three arguments and returning an alist of the same kind as \texttt{caesuraType}.

The first argument is the context.

The second argument is the value of \texttt{caesuraType} with an additional entry \texttt{(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. \texttt{bar-line} indicates that the engraver has observed a \texttt{BarLine} at the current moment.

\texttt{doubleRepeatBarType} \texttt{(string)}

Bar line to insert where the end of one \texttt{\textbackslash repeat volta} coincides with the start of another. The default is ‘\textbullet\textbullet’.

\texttt{doubleRepeatSegnoBarType} \texttt{(string)}

Bar line to insert where an in-staff segno coincides with the end of one \texttt{\textbackslash repeat volta} and the beginning of another. The default is ‘\textbullet|S|:\textbullet’.

\texttt{endRepeatBarType} \texttt{(string)}

Bar line to insert at the end of a \texttt{\textbackslash repeat volta}. The default is ‘\textbullet|.’.

\texttt{endRepeatSegnoBarType} \texttt{(string)}

Bar line to insert where an in-staff segno coincides with the end of a \texttt{\textbackslash repeat volta}. The default is ‘\textbullet|S|’.

\texttt{fineBarType} \texttt{(string)}

Bar line to insert at \texttt{\textbackslash 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 ‘\textbullet’.

\texttt{fineSegnoBarType} \texttt{(string)}

Bar line to insert where an in-staff segno coincides with \texttt{\textbackslash fine}. The default is ‘\textbullet|S|’.

\texttt{fineStartRepeatSegnoBarType} \texttt{(string)}

Bar line to insert where an in-staff segno coincides with \texttt{\textbackslash fine} and the start of a \texttt{\textbackslash repeat volta}. The default is ‘\textbullet|S|:\textbullet’.

\texttt{forbidBreakBetweenBarLines} \texttt{(boolean)}

If set to \texttt{#t}, \texttt{Bar\_engraver} forbids line breaks where there is no bar line.

\texttt{measureBarType} \texttt{(string)}

Bar line to insert at a measure boundary.
printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning of the piece.

printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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'.

dfSegnoStyle (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 re-
quested by the user.

This engraver creates the following layout object(s): BarLine (page 532).

Clef_engraver (page 456)
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 to a clef. Values of 7 and -7 are com-
  mon.

  clefTranspositionStyle (symbol)
  Determines the way the ClefModifier grob of a clef 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 re-
  quested 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 558), and
ClefModifier (page 561).

Collision_engraver (page 457)
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 650).

Cue_clef_engraver (page 459)
Determine and set reference point for pitches in cued voices.

Properties (read)

  clefTransposition (integer)
  Add this much extra transposition to a clef. Values of 7 and -7 are com-
  mon.

  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 to a cue clef. Values of 7 and -7 are common.

cueClefTranspositionStyle (symbol)

Determines the way the ClefModifier grob of a cue clef 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 561), CueClef (page 571), and CueEndClef (page 574).

Divisio_engraver (page 461)

Create divisiones: chant notation for points of breathing or caesura.

Music types accepted: caesura-event (page 51), fine-event (page 52), section-event (page 57), volta-repeat-end-event (page 61), and volta-repeat-start-event (page 61).

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 578).

Dot_column_engraver (page 461)
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 581).

Figured_bass_engraver (page 465)
Make figured bass numbers.
Music types accepted: bass-figure-event (page 50), and rest-event (page 57).
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 538), BassFigureAlignment (page 538), BassFigureBracket (page 540), BassFigureContinuation (page 541), and BassFigureLine (page 541).

Figured_bass_position_engraver (page 466)
Position figured bass alignments over notes.
This engraver creates the following layout object(s): BassFigureAlignmentPositioning (page 539).

Fingering_column_engraver (page 466)
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 599).

Font_size_engraver (page 466)
Put fontSize into font-size grob property.
Properties (read)
  fontSize (number)
  The relative size of all grobs in a context.

Grob_pq_engraver (page 470)
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

busyGros (list)
A queue of \((\text{end-moment} . \ 	ext{grob})\) 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)

busyGros (list)
A queue of \((\text{end-moment} . \ 	ext{grob})\) 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 471)**
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 \text{instrumentName} property labels the staff in the first system, and the \text{shortInstrumentName} property labels following lines.

shortInstrumentName (markup)
See \text{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): \text{InstrumentName} (page 612).

**Key_engraver (page 473)**
Engrave a key signature.

Music types accepted: \text{key-change-event} (page 53),

Properties (read)

createKeyOnClefChange (boolean)
Print a key signature whenever the clef is changed.

explicitKeySignatureVisibility (vector)
‘break-visibility’ function for explicit key changes. ‘\text{\texttt{\textbackslash{}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 616),
and KeySignature (page 619).

Ledger_line_engraver (page 475)
   Create the spanner to draw ledger lines, and notices objects that need ledger lines.
   This engraver creates the following layout object(s): LedgerLineSpanner
   (page 624).

Merge_mmrest_numbers_engraver (page 479)
   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 481)
   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 672).

Ottava_spanner_engraver (page 483)
   Create a text spanner when the ottavation property changes.
   Music types accepted: ottava-event (page 55),
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 655).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),
Piano_pedal_align_engraver (page 486)
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 683), SustainPedalLineSpanner (page 701), and UnaCordaPedalLineSpanner (page 730).
Piano_pedal_engraver (page 486)
Engrave piano pedal symbols and brackets.
Music types accepted: sostenuto-event (page 58), sustain-event (page 59), and una-corda-event (page 60),
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 663), SostenutoPedal (page 682), SustainPedal (page 700), and UnaCordaPedal (page 728).

Pure_from_neighbor_engraver (page 487)
Coordinates items that get their pure heights from their neighbors.

Rest_collision_engraver (page 488)
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 670).

Script_row_engraver (page 489)
Determine order in horizontal side position elements.
This engraver creates the following layout object(s): ScriptRow (page 672).

Separating_line_group_engraver (page 489)
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 691).

Skip_typesetting_engraver (page 490)
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 687).

Staff_collecting_engraver (page 492)
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 493)
Highlights music passages.
Music types accepted: staff-highlight-event (page 58),
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 690).

Staff_symbol_engraver (page 493)
Create the constellation of five (default) staff lines.
Music types accepted: staff-span-event (page 58),
This engraver creates the following layout object(s): StaffSymbol (page 691).

Time_signature_engraver (page 498)
Create a Section 3.1.147 [TimeSignature], page 718, whenever timeSignatureFraction changes.
Music types accepted: time-signature-event (page 60),
Properties (read)
  initialTimeSignatureVisibility (vector)
    break visibility for the initial time signature.
  partialBusy (boolean)
    Signal that \partial acts at the current timestep.
  timeSignatureFraction (positive, finite 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 718).

2.1.18 InternalMensuralStaff
An kind of Staff with settings shared by multiple variants of mensural notation.

This context creates the following layout object(s): Accidental (page 520),
AccidentalCautionary (page 521), AccidentalPlacement (page 522),
AccidentalSuggestion (page 523), BarLine (page 532), BassFigure (page 538),
BassFigureAlignment (page 538), BassFigureAlignmentPositioning (page 539),
BassFigureBracket (page 540), BassFigureContinuation (page 541), BassFigureLine
(page 541), BreathingSign (page 550), CaesuraScript (page 553), Clef (page 558),
ClefModifier (page 561), CueClef (page 571), CueEndClef (page 574), Custos
(page 576), DotColumn (page 581), FingeringColumn (page 599), InstrumentName
(page 612), KeyCancellation (page 616), KeySignature (page 619), LedgerLineSpanner
(page 624), NoteCollision (page 650), OttavaBracket (page 655), PianoPedalBracket
(page 663), RestCollision (page 670), ScriptColumn (page 672), ScriptRow
(page 672), SignumRepetitionis (page 676), SostenutoPedal (page 682),
SostenutoPedalLineSpanner (page 683), StaffEllipsis (page 687), StaffHighlight
(page 690), StaffSpacing (page 691), StaffSymbol (page 691), SustainPedal (page 700),
SustainPedalLineSpanner (page 701), TimeSignature (page 718), UnaCordaPedal
(page 728), UnaCordaPedalLineSpanner (page 730), and VerticalAxisGroup (page 732).

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 at lily/music-functions.scm:1716:0 (context pitch barnum)>)
• Set context property autoCautionaries to '().
• Set context property caesuraTypeTo:
  '((bar-line . "|"))
• 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 fineSegnoBarType to "|.S".
• Set context property fineStartRepeatSegnoBarType to "|.S".
• 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 printKeyCancellation to #f.
• 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 neutral-direction in Custos (page 576), to -1.
• Set grob property neutral-position in Custos (page 576), to 3.
• Set grob property style in Custos (page 576), to 'mensural.
• Set grob property style in TimeSignature (page 718), to 'mensural.

This is a 'Bottom' context; no contexts will be created implicitly from it.
Context InternalMensuralStaff can contain CueVoice (page 100), and NullVoice
(page 245).

This context is built from the following engraver(s):
Accidental_engraver (page 443)
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 bar number. 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 520),
AccidentalCautionary (page 521), AccidentalPlacement (page 522), and
AccidentalSuggestion (page 523).

Alteration_glyph_engraver (page 445)
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)
A list 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 447)
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 732).

Bar_engraver (page 447)
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 49), caesura-event (page 51),
coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52),
section-event (page 57), and segno-mark-event (page 57).

Properties (read)
caesuraType (list)
An alist

  ((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 ‘:|..|:’.

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 #t, Bar_engraver forbids line breaks where there is no bar line.

measureBarType (string)
Bar line to insert at a measure boundary.
printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning of the piece.

printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 re-
quested by the user.

This engraver creates the following layout object(s): BarLine (page 532).

Caesura_ engraver (page 454)
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 51),
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 at-
tached 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 en-
graver 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 550),
and CaesuraScript (page 553).
Clef_engraver (page 456)
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 to a clef. Values of 7 and -7 are common.

- clefTranspositionStyle (symbol)
  Determines the way the ClefModifier grob of a clef 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 558), and ClefModifier (page 561).

Collision_engraver (page 457)
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 650).

Cue_clef_engraver (page 459)
Determine and set reference point for pitches in cued voices.

Properties (read)

- clefTransposition (integer)
  Add this much extra transposition to a clef. 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 to a cue clef. Values of 7 and -7 are common.
cueClefTranspositionStyle (symbol)
   Determines the way the ClefModifier grob of a cue clef 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 re-
   quested 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 561),
CueClef (page 571), and CueEndClef (page 574).

Custos_engraver (page 460)
   Engrave custodes.

Properties (read)
   forbidBreak (boolean)
      If set to #t, prevent a line break at this point, except if explicitly re-
      quested 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 576).

Dot_column_engraver (page 461)
   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 581).

Figured_bass_engraver (page 465)
   Make figured bass numbers.

Music types accepted: bass-figure-event (page 50), and rest-event (page 57),

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 exten-
      der lines.
useBassFigureExtenders (boolean)
Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): BassFigure (page 538), BassFigureAlignment (page 538), BassFigureBracket (page 540), BassFigureContinuation (page 541), and BassFigureLine (page 541).

Figured_bass_position_engraver (page 466)
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
BassFigureAlignmentPositioning (page 539).

Fingering_column_engraver (page 466)
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 599).

Font_size_engraver (page 466)
Put fontSize into font-size grob property.
Properties (read)

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

Grob_pq_engraver (page 470)
Administrates 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 471)
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 612).

Key_engraver (page 473)
Engrave a key signature.
Music types accepted: key-change-event (page 53),

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 re-
quested 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.
tomic (pitch)
The tonic of the current scale.

This engraver creates the following layout object(s): KeyCancellation (page 616), and KeySignature (page 619).

Ledger_line_engraver (page 475)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s): LedgerLineSpanner (page 624).

Merge_mmrest_numbers_engraver (page 479)
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 481)
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 672).

Ottava_spanner_engraver (page 483)
Create a text spanner when the ottavation property changes.
Music types accepted: ottava-event (page 55),
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 655).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Piano_pedal_align_engraver (page 486)
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): SostenutoPedallLineSpanner (page 683), SustainPedallLineSpanner (page 701), and UnaCordaPedallLineSpanner (page 730).
Piano_pedal_ engraver (page 486)
  Engrave piano pedal symbols and brackets.
  Music types accepted: sostenuto-event (page 58), sustain-event (page 59), and
  una-corda-event (page 60),
  Properties (read)
    \texttt{currentCommandColumn} (graphical (layout) object)
    Grob that is X-parent to all current breakable items (clef, key signature, etc.).
    \texttt{pedalSostenutoStrings} (list)
    See \texttt{pedalSustainStrings}.
    \texttt{pedalSostenutoStyle} (symbol)
    See \texttt{pedalSustainStyle}.
    \texttt{pedalSustainStrings} (list)
    A list of strings to print for sustain-pedal. Format is \texttt{(up updown down)},
    where each of the three is the string to print when this is done with the pedal.
    \texttt{pedalSustainStyle} (symbol)
    A symbol that indicates how to print sustain pedals: text, bracket or
    mixed (both).
    \texttt{pedalUnaCordaStrings} (list)
    See \texttt{pedalSustainStrings}.
    \texttt{pedalUnaCordaStyle} (symbol)
    See \texttt{pedalSustainStyle}.
  This engraver creates the following layout object(s): PianoPedalBracket
  (page 663), SostenutoPedal (page 682), SustainPedal (page 700), and
  UnaCordaPedal (page 728).

Pure\textunderscore from\textunderscore neighbor\_engraver (page 487)
  Coordinates items that get their pure heights from their neighbors.

Rest\textunderscore collision\_engraver (page 488)
  Handle collisions of rests.
  Properties (read)
    \texttt{busyGrobs} (list)
    A queue of \texttt{(end-moment . grob)} cons cells. This is for internal (C++)
    use only. This property contains the grobs which are still busy (e.g., note
    heads, spanners, etc.).
  This engraver creates the following layout object(s): RestCollision (page 670).

Script\textunderscore row\_engraver (page 489)
  Determine order in horizontal side position elements.
  This engraver creates the following layout object(s): ScriptRow (page 672).

Separating\_line\_group\_engraver (page 489)
  Generate objects for computing spacing parameters.
  Properties (read)
    \texttt{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 691).

Signum_repetitionis_engraver (page 490)
Create a SignumRepetitionis at the end of a \repeat volta section.
Music types accepted: volta-repeat-end-event (page 61),
This engraver creates the following layout object(s): SignumRepetitionis (page 676).

Skip_typesetting_engraver (page 490)
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 687).

Staff_collecting_engraver (page 492)
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 493)
Highlights music passages.
Music types accepted: staff-highlight-event (page 58),
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 690).

Staff_symbol_engraver (page 493)
Create the constellation of five (default) staff lines.
Music types accepted: staff-span-event (page 58),
This engraver creates the following layout object(s): StaffSymbol (page 691).

Time_signature_engraver (page 498)
Create a Section 3.1.147 [TimeSignature], page 718, whenever timeSignatureFraction changes.
Music types accepted: time-signature-event (page 60),
Properties (read)

initialTimeSignatureVisibility (vector)
   break visibility for the initial time signature.
partialBusy (boolean)
  Signal that \( \text{partial} \) acts at the current timestep.

timeSignatureFraction (positive, finite 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 718).

2.1.19 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 305).

This context creates the following layout object(s): Accidental (page 520),
AccidentalCautionary (page 521), AccidentalPlacement (page 522),
AccidentalSuggestion (page 523), BarLine (page 532), BassFigure (page 538),
BassFigureAlignment (page 538), BassFigureAlignmentPositioning (page 539),
BassFigureBracket (page 540), BassFigureContinuation (page 541), BassFigureLine (page 541),
BreathingSign (page 550), CaesuraScript (page 553), Clef (page 558),
ClefModifier (page 561), CueClef (page 571), CueEndClef (page 574), DotColumn (page 581),
FingeringColumn (page 599), InstrumentName (page 612), KeyCancellation (page 616),
KeySignature (page 619), LedgerLineSpanner (page 624), NoteCollision (page 650),
OttavaBracket (page 655), PianoPedalBracket (page 663), RestCollision (page 670),
ScriptColumn (page 672), ScriptRow (page 672), SostenutoPedal (page 682),
SostenutoPedalLineSpanner (page 683), StaffEllipsis (page 687),
StaffHighlight (page 690), StaffSpacing (page 691), StaffSymbol (page 691),
SustainPedal (page 700), SustainPedalLineSpanner (page 701), UnaCordaPedal (page 728),
UnaCordaPedalLineSpanner (page 730), and VerticalAxisGroup (page 732).

This context sets the following properties:

- Set context property alterationGlyphs to:
  '\((-1/2 . "accidentals.kievanM1")
  (1/2 . "accidentals.kievan1")\)
- Set context property autoAccidentals to:
  '\((\text{Staff \#procedure \at \lily/music-functions.scm:1716:0 (context pitch barnum)})\))
- Set context property autoCautionaries to '().
- Set context property caesuraType to:
  '\((\text{bar-line . "}\))\)
- 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 532), to 3.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type KievanVoice (page 206).

Context KievanStaff can contain CueVoice (page 100), KievanVoice (page 206), and NullVoice (page 245).

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

- Accidental_engraver (page 443)
  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 bar number. 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 520), AccidentalCautionary (page 521), AccidentalPlacement (page 522), and AccidentalSuggestion (page 523).

Alteration_glyph_engraver (page 445)
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 447)**

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 732).

**Bar_engraver (page 447)**

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 49), `caesura-event` (page 51), `coda-mark-event` (page 51), `dal-segno-event` (page 52), `fine-event` (page 52), `section-event` (page 57), and `segno-mark-event` (page 57),

Properties (read)

- `caesuraType` (list)
  An alist
  ```lisp
  ((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.
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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 #t, Bar_engraver forbids line breaks where there is no bar line.

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

printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning of the piece.

printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 ex-
   plicitly 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 re-
      quested by the user.

This engraver creates the following layout object(s): BarLine (page 532).

Caesura_engraver (page 454)
   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 51),

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 550), and CaesuraScript (page 553).

Clef_engraver (page 456)
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 to a clef. Values of 7 and -7 are common.

clefTranspositionStyle (symbol)
Determines the way the ClefModifier grob of a clef 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 558), and ClefModifier (page 561).

Collision_engraver (page 457)
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 650).

Cue_clef_engraver (page 459)
Determine and set reference point for pitches in cued voices.

Properties (read)

clefTransposition (integer)
Add this much extra transposition to a clef. 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 to a cue clef. Values of 7 and -7 are common.

cueClefTranspositionStyle (symbol)
Determines the way the ClefModifier grob of a cue clef 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 561), CueClef (page 571), and CueEndClef (page 574).
Dot_column_engraver (page 461)

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 581).

Figured_bass_engraver (page 465)

Make figured bass numbers.

Music types accepted: bass-figure-event (page 50), and rest-event (page 57).

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 538), BassFigureAlignment (page 538), BassFigureBracket (page 540), BassFigureContinuation (page 541), and BassFigureLine (page 541).

Figured_bass_position_engraver (page 466)

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

  BassFigureAlignmentPositioning (page 539).

Fingering_column_engraver (page 466)

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 599).

Font_size_engraver (page 466)

Put fontSize into font-size grob property.

Properties (read)

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

Grob_pq_engraver (page 470)

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

Instrument\_name\_engraver (page 471)
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 612).

Key\_engraver (page 473)
Engrave a key signature.

Music types accepted: key-change-event (page 53),

Properties (read)

createKeyOnClefChange (boolean)
Print a key signature whenever the clef is changed.

explicitKeySignatureVisibility (vector)
‘break-visibility’ function for explicit key changes. ‘\texttt{\textbackslash override}’ of the break-visibility property will set the visibility for normal (i.e., at the start of the line) key signatures.

eextraNatural (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 \texttt{(step . alter)}, where \texttt{step} is a number from 0 to 6 and \texttt{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 616),
and KeySignature (page 619).

Ledger_line_engraver (page 475)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s): LedgerLineSpanner
(page 624).

Merge_mmrest_numbers_engraver (page 479)
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 481)
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 672).

Ottava_spanner_engraver (page 483)
Create a text spanner when the ottavation property changes.
Music types accepted: ottava-event (page 55),

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 655).

Output_property_ engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Piano_pedal_align_engraver (page 486)
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 683), SustainPedallineSpanner (page 701), and
UnaCordaPedallineSpanner (page 730).

Piano_pedal_engraver (page 486)
Engrave piano pedal symbols and brackets.
Music types accepted: sostenuto-event (page 58), sustain-event (page 59), and
una-corda-event (page 60),
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 663), SostenutoPedal (page 682), SustainPedal (page 700), and
UnaCordaPedal (page 728).
Pure_from_neighbor_engraver (page 487)
Coordinates items that get their pure heights from their neighbors.

Rest_collision_engraver (page 488)
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 670).

Script_row_engraver (page 489)
Determine order in horizontal side position elements.
This engraver creates the following layout object(s): ScriptRow (page 672).

Separating_line_group_engraver (page 489)
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 691).

Skip_typesetting_engraver (page 490)
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 687).

Staff_collecting_engraver (page 492)
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 493)
Highlights music passages.
Music types accepted: staff-highlight-event (page 58),
Properties (read)
  currentCommandColumn (graphical (layout) object)
    Grob that is X-parent to all current breakable items (clef, key signature, etc.).
2.1.20 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 433).

This context creates the following layout object(s): Arpeggio (page 529), Beam (page 542), BendAfter (page 545), BreathingSign (page 550), ClusterSpanner (page 563), ClusterSpannerBeacon (page 564), CombineTextScript (page 566), Dots (page 582), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner (page 592), FingerGlidingSpanner (page 595), Fingering (page 597), Flag (page 599), Glissando (page 603), Hairpin (page 607), InstrumentSwitch (page 613), KievanLigature (page 622), LaissezVibrerTie (page 623), LaissezVibrerTieColumn (page 624), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), NoteColumn (page 651), NoteHead (page 652), NoteSpacing (page 654), PercentRepeat (page 658), PercentRepeatCounter (page 660), PhrasingSlur (page 661), RepeatSlash (page 666), RepeatTie (page 667), RepeatTieColumn (page 668), Rest (page 669), Script (page 670), ScriptColumn (page 672), Slur (page 680), Stem (page 693), StemStub (page 695), StemTremolo (page 696), StringNumber (page 697), StrokeFinger (page 699), TextScript (page 712), TextSpanner (page 714), Tie (page 715), TieColumn (page 717), TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), TrillPitchParentheses (page 723), TrillSpanner (page 724), TupletBracket (page 725), TupletNumber (page 727), and VoiceFollower (page 734).

This context sets the following properties:

- Set context property autoBeaming to #f.
- Set grob property duration-log in NoteHead (page 652), to note-head::calc-kievan-duration-log.
- Set grob property length in Stem (page 693), to 0.0.
- Set grob property positions in Beam (page 542), to beam::get-kievan-positions.
- Set grob property quantized-positions in Beam (page 542), to beam::get-kievan-quantized-positions.
- Set grob property stencil in Flag (page 599), to #f.
- Set grob property stencil in Slur (page 680), to #f.
- Set grob property stencil in Stem (page 693), to #f.
- Set grob property style in Dots (page 582), to 'kievan.
- Set grob property style in NoteHead (page 652), to 'kievan.
- Set grob property style in Rest (page 669), to 'mensural.
- Set grob property X-offset in Stem (page 693), 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 446)
Generate an Arpeggio symbol.
- Music types accepted: `arpeggio-event` (page 50),
- This engraver creates the following layout object(s): `Arpeggio` (page 529).

`Auto_beam_engraver` (page 446)
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 494, properties `stemLeftBeamCount` and `stemRightBeamCount`.
- Music types accepted: `beam-forbid-event` (page 51),
- Properties (read)
  - `autoBeaming` (boolean)
    - If set to `#t` then beams are generated automatically. If set to `#f`, auto-beaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.
  - `baseMoment` (positive moment with no grace part)
    - Smallest unit of time that will stand on its own as a subdivided section.
  - `beamExceptions` (list)
    - An alist of exceptions to autobeam rules that normally end on beats.
  - `beamHalfMeasure` (boolean)
    - Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.
  - `beatStructure` (list)
    - List of `baseMoment`s that are combined to make beats.
  - `subdivideBeams` (boolean)
    - If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `maxSubdivideInterval`, between beats at multiples of `minSubdivideInterval`.

This engraver creates the following layout object(s): `Beam` (page 542).

`Beam_engraver` (page 451)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
- Music types accepted: `beam-event` (page 50),
- Properties (read)
  - `baseMoment` (positive moment with no grace part)
    - Smallest unit of time that will stand on its own as a subdivided section.
  - `beamMelismaBusy` (boolean)
    - Signal if a beam is present.
  - `beatStructure` (list)
    - List of `baseMoment`s that are combined to make beats.
  - `subdivideBeams` (boolean)
    - If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `maxSubdivideInterval`, between beats at multiples of `minSubdivideInterval`.
This engraver creates the following layout object(s): Beam (page 542).

**Bend_engraver (page 453)**
Create fall spanners.
Music types accepted: bend-after-event (page 51),
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 545).

**Breathing_sign_engraver (page 454)**
Notate breath marks.
Music types accepted: breathing-event (page 51),
Properties (read)

- `breathMarkType` (symbol)
  The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 550).

**Chord_tremolo_engraver (page 456)**
Generate beams for tremolo repeats.
Music types accepted: tremolo-span-event (page 60),
This engraver creates the following layout object(s): Beam (page 542).

**Cluster_spanner_engraver (page 457)**
Engrave a cluster using Spanner notation.
Music types accepted: cluster-note-event (page 51),
This engraver creates the following layout object(s): ClusterSpanner (page 563), and ClusterSpannerBeacon (page 564).

**Dots_engraver (page 462)**
Create Section 3.1.43 [Dots], page 582, objects for Section 3.2.119 [rhythmic-head-interface], page 801s.
This engraver creates the following layout object(s): Dots (page 582).

**Double_percent_repeat_engraver (page 462)**
Make double measure repeats.
Music types accepted: double-percent-event (page 52),
Properties (read)

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

- `measureLength` (positive moment with no grace part)
  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 re-
quested by the user.

This engraver creates the following layout object(s): DoublePercentRepeat
(page 583), and DoublePercentRepeatCounter (page 584).

Dynamic_align_engraver (page 463)
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 589).

Dynamic_engraver (page 464)
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted: absolute-dynamic-event (page 49),
break-dynamic-span-event (page 51), and span-dynamic-event
(page 58),

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 590),
DynamicTextSpanner (page 592), and Hairpin (page 607).

Finger_glide_engraver (page 466)
Engraver to print a line between two Fingering grobs.
Music types accepted: note-event (page 55),
This engraver creates the following layout object(s): FingerGlideSpanner
(page 595).
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Fingering_engraver (page 466)
Create fingering scripts.
Music types accepted: fingering-event (page 53),
This engraver creates the following layout object(s): Fingering (page 597).

Font_size_engraver (page 466)
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 467)
Forbid line breaks when note heads are still playing at some point.
Properties (read)

busyGrosbs (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 re-quested by the user.

Glissando_engraver (page 468)
Engrave glissandi.
Music types accepted: glissando-event (page 53),
Properties (read)

glissandoMap (list)
A map in the form of '((source1 . target1) (source2 . target2) (sourcecn . targetrn)) 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 num-ber of note-heads in the two note columns between which the glissandi occur.
This engraver creates the following layout object(s): Glissando (page 603).

Grace_auto_beam_engraver (page 468)
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 51),
Properties (read)

autoBeaming (boolean)
If set to #t then beams are generated automatically. If set to #f, auto-beaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.
This engraver creates the following layout object(s): Beam (page 542).

Grace_beam_engraver (page 469)
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 50),

Properties (read)

  baseMoment (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number of
  beamlets, dependent on maxSubdivideInterval, between beats at
  multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Grace_engraver (page 469)
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 470)
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 472)
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 613).

Kievan_ligature_engraver (page 474)
Handle Kievan_ligature_events by glueing Kievan heads together.
Music types accepted: ligature-event (page 54),

This engraver creates the following layout object(s): KievanLigature (page 622).
Laissez_vibrer_engraver (page 475)
Create laissez vibrer items.
Music types accepted: laissez-vibrer-event (page 53).
This engraver creates the following layout object(s): LaissezVibrerTie (page 623), and LaissezVibrerTieColumn (page 624).

Multi_measure_rest_engraver (page 480)
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 642.
Music types accepted: multi-measure-articulation-event (page 54), multi-measure-rest-event (page 54), and multi-measure-text-event (page 54).
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 bar number. 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 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), and MultiMeasureRestText (page 647).

New_fingering_engraver (page 481)
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 597), Script (page 670), StringNumber (page 697), and StrokeFinger (page 699).

Note_head_line_engraver (page 482)
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 734).

Note_heads_engraver (page 482)
  Generate note heads.
  Music types accepted: note-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.
    staffLineLayoutFunction (procedure)
    Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s): NoteHead (page 652).

Note_spacing_engraver (page 483)
  Generate NoteSpacing, an object linking horizontal lines for use in spacing.
  This engraver creates the following layout object(s): NoteSpacing (page 654).

Output_property_engraver (page 483)
  Apply a procedure to any grob acknowledged.
  Music types accepted: apply-output-event (page 50),

Part_combine_engraver (page 485)
  Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
  Music types accepted: note-event (page 55), and part-combine-event (page 56),
  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 566).

Percent_repeat_engraver (page 485)
  Make whole measure repeats.
  Music types accepted: percent-event (page 56),
  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 658), and PercentRepeatCounter (page 660).

Phrasing_slur_engraver (page 485)
Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 491.
Music types accepted: note-event (page 55), and phrasing-slur-event (page 56),
This engraver creates the following layout object(s): PhrasingSlur (page 661).

Pitched_trill_engraver (page 487)
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s): TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), and TrillPitchParentheses (page 723).

Repeat_tie_engraver (page 488)
Create repeat ties.
Music types accepted: repeat-tie-event (page 56),
This engraver creates the following layout object(s): RepeatTie (page 667), and RepeatTieColumn (page 668).

Rest_engraver (page 488)
Engrave rests.
Music types accepted: rest-event (page 57),
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 669).

Rhythmic_column_engraver (page 489)
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s): NoteColumn (page 651).

Script_column_engraver (page 489)
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 672).

Script_engraver (page 489)
Handle note scripted articulations.
Music types accepted: articulation-event (page 50),
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 670).

**Slash_repeat_engraver** (page 490)

Make beat repeats.

Music types accepted: repeat-slash-event (page 56),

This engraver creates the following layout object(s): DoubleRepeatSlash (page 586), and RepeatSlash (page 666).

**Slur_engraver** (page 491)

Build slur grobs from slur events.

Music types accepted: note-event (page 55), and slur-event (page 57),

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 680).

**Spanner_break_forbid_engraver** (page 492)

Forbid breaks in certain spanners.

**Stem_engraver** (page 494)

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

Music types accepted: tremolo-event (page 60),

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 599), Stem (page 693), StemStub (page 695), and StemTremolo (page 696).

**Text_engraver** (page 496)

Create text scripts.

Music types accepted: text-script-event (page 60),

This engraver creates the following layout object(s): TextScript (page 712).

**Text_spanner_engraver** (page 497)

Create text spanner from an event.

Music types accepted: text-span-event (page 60),

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 714).

_Tie_engraver_ (page 497)
Generate ties between note heads of equal pitch.
Music types accepted: tie-event (page 60),
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 715), and TieColumn (page 717).

_Trill_spanner_engraver_ (page 499)
Create trill spanners.
Music types accepted: trill-span-event (page 60),
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 724).

_Tuplet_engraver_ (page 500)
Catch tuplet events and generate appropriate bracket.
Music types accepted: tuplet-span-event (page 60),
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 725), and TupletNumber (page 727).

### 2.1.21 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 612), LyricExtender (page 629), LyricHyphen (page 629), LyricSpace (page 633), LyricText
This context sets the following properties:

- Set context property instrumentName to '().
- Set context property lyricRepeatCountFormatter to #<procedure at lily/translation-functions.scm:208:4 (context repeat-count)>.
- Set context property searchForVoice to #f.
- Set context property shortInstrumentName to '().
- Set grob property bar-extent in BarLine (page 532), to:
  '(-0.05 . 0.05)
- Set grob property font-size in InstrumentName (page 612), to 1.0.
- Set grob property nonstaff-nonstaff-spacing in VerticalAxisGroup (page 732), to:
  '((basic-distance . 0)
   (minimum-distance . 2.8)
   (padding . 0.2)
   (stretchability . 0))
- Set grob property nonstaff-relatedstaff-spacing in VerticalAxisGroup (page 732), to:
  '((basic-distance . 5.5)
   (padding . 0.5)
   (stretchability . 1))
- Set grob property nonstaff-unrelatedstaff-spacing.padding in VerticalAxisGroup (page 732), to 1.5.
- Set grob property remove-empty in VerticalAxisGroup (page 732), to #t.
- Set grob property remove-first in VerticalAxisGroup (page 732), to #t.
- Set grob property self-alignment-Y in InstrumentName (page 612), to #f.
- Set grob property short-bar-extent in BarLine (page 532), to:
  '(-0.05 . 0.05)
- Set grob property staff-affinity in VerticalAxisGroup (page 732), 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 447)
  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 732).

Extender_engraver (page 465)
Create lyric extenders.
Music types accepted: completize-extender-event (page 52), and extender-event (page 52),
Properties (read)

extendsOverRests (boolean)
Whether to continue extenders as they cross a rest.

This engraver creates the following layout object(s): LyricExtender (page 629).

Font_size_engraver (page 466)
Put fontSize into font-size grob property.
Properties (read)

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

Hyphen_engraver (page 471)
Create lyric hyphens, vowel transitions and distance constraints between words.
Music types accepted: hyphen-event (page 53), and vowel-transition-event (page 61),
This engraver creates the following layout object(s): LyricHyphen (page 629), LyricSpace (page 633), and VowelTransition (page 738).

Instrument_name_engraver (page 471)
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 612).

Lyric_engraver (page 475)
Engrave text for lyrics.
Music types accepted: lyric-event (page 54),
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 633).

Pure_from_neighbor_engraver (page 487)
  Coordinates items that get their pure heights from their neighbors.

Stanza_number_engraver (page 494)
  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 692).

2.1.22 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 305).

  This context creates the following layout object(s): Accidental (page 520),
  AccidentalCautionary (page 521), AccidentalPlacement (page 522),
  AccidentalSuggestion (page 523), BarLine (page 532), BassFigure (page 538),
  BassFigureAlignment (page 538), BassFigureAlignmentPositioning (page 539),
  BassFigureBracket (page 540), BassFigureContinuation (page 541), BassFigureLine (page 541),
  BreathingSign (page 550), CaesuraScript (page 553), Clef (page 558),
  ClefModifier (page 561), CueClef (page 571), CueEndClef (page 574), Custos (page 576),
  DotColumn (page 581), FingeringColumn (page 599), InstrumentName (page 612),
  KeyCancellation (page 616), KeySignature (page 619), LedgerLineSpanner (page 624),
  NoteCollision (page 650), OttavaBracket (page 655), PianoPedalBracket (page 663),
  RestCollision (page 670), ScriptColumn (page 672), ScriptRow (page 672),
  SignumRepetitionis (page 676), SostenutoPedal (page 682),
  SostenutoPedalLineSpanner (page 683), StaffEllipsis (page 687), StaffHighlight (page 690),
  StaffSpacing (page 691), StaffSymbol (page 691), SustainPedal (page 700),
  SustainPedalLineSpanner (page 701), TimeSignature (page 718), UnaCordaPedal (page 728),
  UnaCordaPedalLineSpanner (page 730), and VerticalAxisGroup (page 732).

  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 at lily/music-functions.scm:1716:0 (context pitch barnum)>))
• Set context property autoCautionaries to '().
• Set context property caesuraType to:
  '((bar-line . "|"))
• 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 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 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 hair-thickness in BarLine (page 532), to 0.6.
• Set grob property neutral-direction in Custos (page 576), to -1.
• Set grob property neutral-position in Custos (page 576), to 3.
• Set grob property style in Custos (page 576), to 'mensural.
• Set grob property style in TimeSignature (page 718), to 'mensural.
• Set grob property thick-thickness in BarLine (page 532), to 1.8.
• Set grob property thickness in StaffSymbol (page 691), to 0.6.
Chapter 2: Translation

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type MensuralVoice (page 233).

Context MensuralStaff can contain CueVoice (page 100), MensuralVoice (page 233), and NullVoice (page 245).

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

Accidental_engraver (page 443)

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. \( \texttt{(#t . #f)} \) does not make sense.

autoCautionaries (list)
  List similar to autoAccidentals, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

extraNatural (boolean)
  Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

harmonicAccidentals (boolean)
  If set, harmonic notes in chords get accidentals.
internalBarNumber (integer)
Contains the current bar number. This property is used for internal 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 520),
AccidentalCautionary (page 521), AccidentalPlacement (page 522), and
AccidentalSuggestion (page 523).

Alteration_glyph_engraver (page 445)
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 447)
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 732).
Bar_engraver (page 447)
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 49), caesura-event (page 51),
coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52),
section-event (page 57), and segno-mark-event (page 57),
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 at-
  tached 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 en-
  graver 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 ‘:\ldots\:’.
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 ‘:\ldots.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 de-
  fault 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 \#t, \bar\-engraver forbids line breaks where there is no bar line.

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

printInitialRepeatBar (boolean)
  Use a special bar line at the start of a volta repeat even at the beginning of the piece.

printTrivialVoltaRepeats (boolean)
  Notate volta-style repeats even when the repeat count is 1.

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 return-count
  End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
  Start a repeated section. repeat-count is the number of times to perform this 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 532).

Caesura_engraver (page 454)
   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 51),

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 550), and CaesuraScript (page 553).

Clef_engraver (page 456)
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 to a clef. Values of 7 and -7 are common.

  clefTranspositionStyle (symbol)
  Determines the way the ClefModifier grob of a clef 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 558), and ClefModifier (page 561).

Collision_engraver (page 457)
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 650).

Cue_clef_engraver (page 459)
Determine and set reference point for pitches in cued voices.

Properties (read)

  clefTransposition (integer)
  Add this much extra transposition to a clef. 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 to a cue clef. Values of 7 and -7 are common.

cueClefTranspositionStyle (symbol)  
Determines the way the ClefModifier grob of a cue clef 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 561), CueClef (page 571), and CueEndClef (page 574).

Custos_engraver (page 460)  
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 576).

Dot_column_engraver (page 461)  
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 581).

Figured_bass_engraver (page 465)  
Make figured bass numbers.

Music types accepted: bass-figure-event (page 50), and rest-event (page 57).

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.

deprecated figuredBassFormatter (procedure)
    A routine generating a markup for a bass figure.

deprecated ignoreFiguredBassRest (boolean)
    Don’t swallow rest events.

implicitBassFigures (list)
    A list of bass figures that are not printed as numbers, but only as exten-
    der lines.

useBassFigureExtenders (boolean)
    Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s): BassFigure (page 538),
BassFigureAlignment (page 538), BassFigureBracket (page 540),
BassFigureContinuation (page 541), and BassFigureLine (page 541).

Figured_bass_position_engraver (page 466)
    Position figured bass alignments over notes.
    This engraver creates the following layout object(s):
    BassFigureAlignmentPositioning (page 539).

Fingering_column_engraver (page 466)
    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 599).

Font_size_engraver (page 466)
    Put fontSize into font-size grob property.
    Properties (read)

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

Grob_pq_engraver (page 470)
    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 471)
    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 612).

Key_ engraver (page 473)
Engrave a key signature.

Music types accepted: key-change-event (page 53),
Properties (read)

createKeyOnClefChange (boolean)
Print a key signature whenever the clef is changed.

explicitKeySignatureVisibility (vector)
\'break-visibility\' function for explicit key changes. \'\over \r \r \r r i d e e \' 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 re-
quested 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 \((\text{step} \cdot \text{alter})\) or
\(((\text{octave} \cdot \text{step}) \cdot \text{alter})\), where \text{step} is a number in the range 0 to 6
and \text{alter} a fraction, denoting alteration. For alterations, use symbols,
e.g., \text{keyAlterations} = #'((6 \cdot \text{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 616),
and KeySignature (page 619).

Ledger_line_engraver (page 475)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s): LedgerLineSpanner
(page 624).

Merge_mmrest_numbers_engraver (page 479)
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 481)
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 672).

Ottava_spanner_engraver (page 483)
Create a text spanner when the ottavation property changes.
Music types accepted: ottava-event (page 55),

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 655).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Piano_pedal_align_engraver (page 486)
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 683), `SustainPedalLineSpanner` (page 701), and `UnaCordaPedalLineSpanner` (page 730).

`Piano_pedal_engraver` (page 486)
  Engrave piano pedal symbols and brackets.
  Music types accepted: `sostenuto-event` (page 58), `sustain-event` (page 59), and `una-corda-event` (page 60),

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 663), `SostenutoPedal` (page 682), `SustainPedal` (page 700), and `UnaCordaPedal` (page 728).

`Pure_from_neighbor_engraver` (page 487)
  Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 488)
  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 670).
Script_row_engraver (page 489)
Determine order in horizontal side position elements.
This engraver creates the following layout object(s): ScriptRow (page 672).

Separating_line_group_engraver (page 489)
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 691).

Signum_repetitionis_engraver (page 490)
Create a SignumRepetitionis at the end of a \repeat volta section.
Music types accepted: volta-repeat-end-event (page 61),
This engraver creates the following layout object(s): SignumRepetitionis (page 676).

Skip_typesetting_engraver (page 490)
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 687).

Staff_collecting_engraver (page 492)
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 493)
Highlights music passages.
Music types accepted: staff-highlight-event (page 58),
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 690).

Staff_symbol_engraver (page 493)
Create the constellation of five (default) staff lines.
Music types accepted: staff-span-event (page 58),
This engraver creates the following layout object(s): StaffSymbol (page 691).
Create a Section 3.1.147 [TimeSignature], page 718, whenever timeSignatureFraction changes.

Music types accepted: time-signature-event (page 60),

Properties (read)

initialTimeSignatureVisibility (vector)
break visibility for the initial time signature.

partialBusy (boolean)
Signal that partial acts at the current timestep.

timeSignatureFraction (positive, finite 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 718).

2.1.23 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 433).

This context creates the following layout object(s): Arpeggio (page 529), Beam (page 542), BendAfter (page 545), BreathingSign (page 550), ClusterSpanner (page 563), ClusterSpannerBeacon (page 564), CombineTextScript (page 566), Dots (page 582), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner (page 592), FingerGlideSpanner (page 595), Fingering (page 597), Flag (page 599), Glissando (page 603), Hairpin (page 607), InstrumentSwitch (page 613), LaissezVibrerTie (page 623), LaissezVibrerTieColumn (page 624), MensuralLigature (page 640), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), NoteColumn (page 651), NoteHead (page 652), NoteSpacing (page 654), PercentRepeat (page 658), PercentRepeatCounter (page 660), PhrasingSlur (page 661), RepeatSlash (page 666), RepeatTie (page 667), RepeatTieColumn (page 668), Rest (page 669), Script (page 670), ScriptColumn (page 672), Stem (page 693), StemStub (page 695), StemTremolo (page 696), StringNumber (page 697), StrokeFinger (page 699), TextScript (page 712), TextSpanner (page 714), Tie (page 715), TieColumn (page 717), TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), TrillPitchParentheses (page 723), TrillSpanner (page 724), TupletBracket (page 725), TupletNumber (page 727), and VoiceFollower (page 734).

This context sets the following properties:
- Set context property autoBeaming to #f.
- Set grob property style in Flag (page 599), to 'mensural.
- Set grob property style in NoteHead (page 652), to 'mensural.
- Set grob property style in Rest (page 669), 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 446)
Generate an Arpeggio symbol.
Music types accepted: arpeggio-event (page 50),
This engraver creates the following layout object(s): Arpeggio (page 529).

Auto beam engraver (page 446)
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 494, properties stemLeftBeamCount and stemRightBeamCount.
Music types accepted: beam-forbid-event (page 51),
Properties (read)
  autoBeaming (boolean)
  If set to #t then beams are generated automatically. If set to #f, auto-
  beaming is switched off as soon as the current beam (if any) is finished
  according to the auto-beaming rules.

baseMoment (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number
  of beamlets, dependent on maxSubdivideInterval, between beats at
  multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Beam engraver (page 451)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags
instead of beams.
Music types accepted: beam-event (page 50),
Properties (read)
  baseMoment (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number
  of beamlets, dependent on maxSubdivideInterval, between beats at
  multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).
Bend\_engraver (page 453)
Create fall spanners.
Music types accepted: bend-after-event (page 51),
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 545).

Breathing\_sign\_engraver (page 454)
Notate breath marks.
Music types accepted: breathing-event (page 51),
Properties (read)

- breathMarkType (symbol)
  The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 550).

Chord\_tremolo\_engraver (page 456)
Generate beams for tremolo repeats.
Music types accepted: tremolo-span-event (page 60),
This engraver creates the following layout object(s): Beam (page 542).

Cluster\_spanner\_engraver (page 457)
Engrave a cluster using Spanner notation.
Music types accepted: cluster-note-event (page 51),
This engraver creates the following layout object(s): ClusterSpanner (page 563),
and ClusterSpannerBeacon (page 564).

Dots\_engraver (page 462)
Create Section 3.1.43 \[Dots\], page 582, objects for Section 3.2.119 \[rhythmic-head-interface\], page 801s.
This engraver creates the following layout object(s): Dots (page 582).

Double\_percent\_repeat\_engraver (page 462)
Make double measure repeats.
Music types accepted: double-percent-event (page 52),
Properties (read)

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

- measureLength (positive moment with no grace part)
  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 re-
quested by the user.

This engraver creates the following layout object(s): DoublePercentRepeat
(page 583), and DoublePercentRepeatCounter (page 584).

Dynamic_align_engraver (page 463)
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 589).

Dynamic_engraver (page 464)
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted: absolute-dynamic-event (page 49),
break-dynamic-span-event (page 51), and span-dynamic-event
(page 58),
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 590),
DynamicTextSpanner (page 592), and Hairpin (page 607).

Finger_glide_engraver (page 466)
Engraver to print a line between two Fingering grobs.
Music types accepted: note-event (page 55),
This engraver creates the following layout object(s): FingerGlideSpanner
(page 595).
Fingering_engraver (page 466)
Create fingering scripts.
Music types accepted: fingering-event (page 53),
This engraver creates the following layout object(s): Fingering (page 597).

Font_size_engraver (page 466)
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 467)
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 re-
    quested by the user.

Glissando_engraver (page 468)
Engrave glissandi.
Music types accepted: glissando-event (page 53),
Properties (read)
  glissandoMap (list)
    A map in the form of ’((source1 . target1) (source2 . target2) (sourcecn .
    targetnn)) 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 num-
    ber of note-heads in the two note columns between which the glissandi
    occur.

This engraver creates the following layout object(s): Glissando (page 603).

Grace_auto_beam_engraver (page 468)
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 51),
Properties (read)
  autoBeaming (boolean)
    If set to #t then beams are generated automatically. If set to #f, auto-
    beaming is switched off as soon as the current beam (if any) is finished
    according to the auto-beaming rules.

This engraver creates the following layout object(s): Beam (page 542).

Grace_beam_engraver (page 469)
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 50),

Properties (read)

baseMoment (positive moment with no grace part)
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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Grace_engraver (page 469)
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 470)
Administratre 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 472)
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 613).

Laissez_vibrer_engraver (page 475)
Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 53),

This engraver creates the following layout object(s): LaissezVibrerTie (page 623), and LaissezVibrerTieColumn (page 624).
Mensural_ligature_engraver (page 479)
Handle Mensural_ligature_events by gluing special ligature heads together.
Music types accepted: ligature-event (page 54),
This engraver creates the following layout object(s): MensuralLigature (page 640).

Multi_measure_rest_engraver (page 480)
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 642.
Music types accepted: multi-measure-articulation-event (page 54),
multi-measure-rest-event (page 54), and multi-measure-text-event (page 54),
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 bar number. 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 642),
MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), and MultiMeasureRestText (page 647).

New_fingering_engraver (page 481)
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 597), Script (page 670), StringNumber (page 697), and StrokeFinger (page 699).

Note_head_line_engraver (page 482)
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 734).

Note_heads engraver (page 482)
Generate note heads.
Music types accepted: note-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.
  staffLineLayoutFunction (procedure)
  Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s): NoteHead (page 652).

Note_spacing engraver (page 483)
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s): NoteSpacing (page 654).

Output_property engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Part_combine engraver (page 485)
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted: note-event (page 55), and part-combine-event (page 56),
Properties (read)
  aDueText (markup)
  Text to print at a unisono passage.
  partCombineTextsOnNote (boolean)
  Print part-combine texts only on the next note rather than immediately on rests or skips.
  printPartCombineTexts (boolean)
  Set ‘Solo’ and ‘A due’ texts in the part combiner?
  soloIIText (markup)
  The text for the start of a solo for voice ‘two’ when part-combining.
  soloText (markup)
  The text for the start of a solo when part-combining.

This engraver creates the following layout object(s): CombineTextScript (page 566).

Percent_repeat engraver (page 485)
Make whole measure repeats.
Music types accepted: percent-event (page 56),
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 658),
and PercentRepeatCounter (page 660).

Phrasing_slur_engraver (page 485)
Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 491.
Music types accepted: note-event (page 55), and phrasing-slur-event
(page 56),
This engraver creates the following layout object(s): PhrasingSlur (page 661).

Pitched_trill_engraver (page 487)
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s): TrillPitchAccidental
(page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), and
TrillPitchParentheses (page 723).

Repeat_tie_engraver (page 488)
Create repeat ties.
Music types accepted: repeat-tie-event (page 56),
This engraver creates the following layout object(s): RepeatTie (page 667), and
RepeatTieColumn (page 668).

Rest_engraver (page 488)
Engrave rests.
Music types accepted: rest-event (page 57),
Properties (read)

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

This engraver creates the following layout object(s): Rest (page 669).

Rhythmic_column_engraver (page 489)
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s): NoteColumn (page 651).

Script_column_engraver (page 489)
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 672).

Script_engraver (page 489)
Handle note scripted articulations.
Music types accepted: articulation-event (page 50),
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 670).

Slash_repeat_engraver (page 490)
Make beat repeats.
Music types accepted: repeat-slash-event (page 56),
This engraver creates the following layout object(s): DoubleRepeatSlash (page 586), and RepeatSlash (page 666).

Spanner_break_forbid_engraver (page 492)
Forbid breaks in certain spanners.

Stem_engraver (page 494)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.
Music types accepted: tremolo-event (page 60),
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 599), Stem (page 693), StemStub (page 695), and StemTremolo (page 696).

Text_engraver (page 496)
Create text scripts.
Music types accepted: text-script-event (page 60),
This engraver creates the following layout object(s): TextScript (page 712).

Text_spanner_engraver (page 497)
Create text spanner from an event.
Music types accepted: text-span-event (page 60),
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 714).

Tie_engraver (page 497)
Generate ties between note heads of equal pitch.
Music types accepted: tie-event (page 60),
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 715), and TieColumn (page 717).

Trill_spanner_ engraver (page 499)

Create trill spanners.

Music types accepted: trill-span-event (page 60),

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 724).

Tuplet_ engraver (page 500)

Catch tuplet events and generate appropriate bracket.

Music types accepted: tuplet-span-event (page 60),

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 725), and TupletNumber (page 727).

2.1.24 NoteNames

A context for printing the names of notes.

This context also accepts commands for the following context(s): Staff (page 305).

This context creates the following layout object(s): NoteName (page 653), StaffSpacing (page 691), Tie (page 715), TieColumn (page 717), and VerticalAxisGroup (page 732).

This context sets the following properties:

• Set grob property nonstaff-nonstaff-spacing in VerticalAxisGroup (page 732), to:

'(((basic-distance . 0)
  (minimum-distance . 2.8)
  (padding . 0.2)
  (stretchability . 0))

• Set grob property nonstaff-relatedstaff-spacing in VerticalAxisGroup (page 732), to:

'(((basic-distance . 5.5)
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- Set grob property `nonstaff-unrelatedstaff-spacing.padding` in `VerticalAxisGroup` (page 732), to 1.5.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 732), 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 445)
- 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 447)
- 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 732).

**Note_name_engraver** (page 482)
- Print pitches as words.

**Music types accepted:** `note-event` (page 55),

**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 653).

Separating_line_group_engraver (page 489)
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 691).

Tie_engraver (page 497)
Generate ties between note heads of equal pitch.
Music types accepted: tie-event (page 60),
Properties (read)
skipTypesetting (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful
to debug 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 715), and
TieColumn (page 717).

2.1.25 NullVoice
For aligning lyrics without printing notes

This context also accepts commands for the following context(s): Staff (page 305), and
Voice (page 433).

This context creates the following layout object(s): Beam (page 542), NoteHead (page 652),
Slur (page 680), Tie (page 715), and TieColumn (page 717).

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 652), to #t.
• Set grob property stencil in Beam (page 542), to #f.
• Set grob property stencil in NoteHead (page 652), to #f.
• Set grob property stencil in Slur (page 680), to #f.
• Set grob property stencil in Tie (page 715), to #f.
• Set grob property X-extent in NoteHead (page 652), to #<procedure 7e7934ec3940 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 451)**
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted: beam-event (page 50),
Properties (read)

- **baseMoment** (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

**Grob_pq_engraver (page 470)**
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

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

Properties (write)

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

**Note_heads_engraver (page 482)**
Generate note heads.
Music types accepted: note-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.

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

This engraver creates the following layout object(s): NoteHead (page 652).

**Pitch_squash_engraver (page 487)**
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 491)
Build slur grobs from slur events.
Music types accepted: note-event (page 55), and slur-event (page 57),
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 680).

Tie_ engraver (page 497)
Generate ties between note heads of equal pitch.
Music types accepted: tie-event (page 60),
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 715), and TieColumn (page 717).

2.1.26 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 732).

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Staff (page 305).

Context OneStaff can contain ChordNames (page 98), DrumStaff (page 111), Dynamics (page 129), FiguredBass (page 135), FretBoards (page 136), GregorianTranscriptionLyrics (page 140), GregorianTranscriptionStaff (page 143), KievanStaff (page 193), Lyrics (page 216), MensuralStaff (page 219), NoteNames (page 243), PetrucciStaff (page 248), RhythmicStaff (page 275), Staff (page 305), TabStaff (page 360), VaticanaLyrics (page 383), and VaticanaStaff (page 409).
This context is built from the following engraver(s):

Axis_group_engraver (page 447)

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 732).

2.1.27 PetrucciStaff

A kind of Staff approximating the mensural typesetting of Ottaviano Petrucci’s Harmonices Musices Odhecaton (Venice, 1501).

This context also accepts commands for the following context(s): Staff (page 305).

This context creates the following layout object(s): Accidental (page 520), AccidentalCautionary (page 521), AccidentalPlacement (page 522), AccidentalSuggestion (page 523), BarLine (page 532), BassFigure (page 538), BassFigureAlignment (page 538), BassFigureAlignmentPositioning (page 539), BassFigureBracket (page 540), BassFigureContinuation (page 541), BassFigureLine (page 541), BreathingSign (page 550), CaesuraScript (page 553), Clef (page 558), ClefModifier (page 561), CueClef (page 571), CueEndClef (page 574), Custos (page 576), DotColumn (page 581), FingeringColumn (page 599), InstrumentName (page 612), KeyCancellation (page 616), KeySignature (page 619), LedgerLineSpanner (page 624), NoteCollision (page 650), OttavaBracket (page 655), PianoPedalBracket (page 663), RestCollision (page 670), ScriptColumn (page 672), ScriptRow (page 672), SignumRepetitionis (page 676), SostenutoPedal (page 682), SostenutoPedalLineSpanner (page 683), StaffEllipsis (page 687), StaffHighlight (page 690), StaffSpacing (page 691), StaffSymbol (page 691), SustainPedal (page 700), SustainPedalLineSpanner (page 701), TimeSignature (page 718), UnaCordaPedal (page 728), UnaCordaPedallineSpanner (page 730), and VerticalAxisGroup (page 732).

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 at lily/music-functions.scm:1716:0 (context pitch barnum)>
    #<procedure neo-modern-accidental-rule (context pitch barnum)>>)
• Set context property autoAccidentals to:
  `'((Staff #<procedure at lily/music-functions.scm:1716:0 (context pitch barnum))
  • 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 doubleRepeatSegnoBarType to "S".
• Set context property endRepeatBarType to `().
• Set context property endRepeatSegnoBarType to "S".
• Set context property extraNatural to #f.
• 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 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 underlyingRepeatBarType to `().
• Set grob property bar-extent in BarLine (page 532), to:
  `'((-2.5 . 2.5)
• Set grob property bar-extent in SignumRepetitionis (page 676), to:
  `'((-2.5 . 2.5)
• Set grob property hair-thickness in BarLine (page 532), to 2.21.
• Set grob property `hair-thickness` in `SignumRepetitionis` (page 676), to 2.21.
• Set grob property `kern` in `BarLine` (page 532), to 2.9.
• Set grob property `kern` in `SignumRepetitionis` (page 676), to 2.9.
• Set grob property `neutral-direction` in `Custos` (page 576), to -1.
• Set grob property `neutral-position` in `Custos` (page 576), to 3.
• Set grob property `rounded` in `BarLine` (page 532), to #t.
• Set grob property `rounded` in `SignumRepetitionis` (page 676), to #t.
• Set grob property `short-bar-extent` in `BarLine` (page 532), to `'(1.5 . 1.5)`
• Set grob property `short-bar-extent` in `SignumRepetitionis` (page 676), to `'(1.5 . 1.5)`
• Set grob property `style` in `Custos` (page 576), to 'mensural.
• Set grob property `style` in `TimeSignature` (page 718), to 'mensural.
• Set grob property `thick-thickness` in `BarLine` (page 532), to 2.9.
• Set grob property `thick-thickness` in `SignumRepetitionis` (page 676), to 2.9.
• Set grob property `thickness` in `StaffSymbol` (page 691), 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 262).

Context `PetrucciStaff` can contain `CueVoice` (page 100), `NullVoice` (page 245), and `PetrucciVoice` (page 262).

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

- `Accidental_engraver` (page 443)
  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.
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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.

eextraNatural (boolean)
  Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

harmonicAccidentals (boolean)
  If set, harmonic notes in chords get accidentals.

internalBarNumber (integer)
  Contains the current bar number. This property is used for internal 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 520), AccidentalCautionary (page 521), AccidentalPlacement (page 522), and AccidentalSuggestion (page 523).

Alteration_glyph_engraver (page 445)
  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 447)
  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 732).

Bar_engraver (page 447)
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 49), caesura-event (page 51), coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52), section-event (page 57), and segno-mark-event (page 57),

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 #t, Bar_engraver forbids line breaks where there is no bar line.

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

printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning of the piece.

printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 532).

Caesura_engraver (page 454)
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 51),

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...))
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 550), and CaesuraScript (page 553).

Clef_engraver (page 456)
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 to a clef. Values of 7 and -7 are common.
clefTranspositionStyle (symbol)
Determines the way the ClefModifier grob of a clef 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 558), and
ClefModifier (page 561).

Collision_engraver (page 457)
   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 650).

Cue_clef_engraver (page 459)
   Determine and set reference point for pitches in cued voices.
Properties (read)
   clefTransposition (integer)
      Add this much extra transposition to a clef. Values of 7 and -7 are com-
      mon.
   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 to a cue clef. Values of 7 and -7 are
      common.
   cueClefTranspositionStyle (symbol)
      Determines the way the ClefModifier grob of a cue clef 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 re-
      quested 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 561),
   CueClef (page 571), and CueEndClef (page 574).

Custos_engraver (page 460)
   Engrave custodes.
Properties (read)
   forbidBreak (boolean)
      If set to #t, prevent a line break at this point, except if explicitly re-
      quested 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 576).

Dot_column_engraver (page 461)
   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 581).

Figured_bass_engraver (page 465)
   Make figured bass numbers.
   Music types accepted: bass-figure-event (page 50), and rest-event (page 57),
   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 538),
   BassFigureAlignment (page 538), BassFigureBracket (page 540),
   BassFigureContinuation (page 541), and BassFigureLine (page 541).

Figured_bass_position_engraver (page 466)
   Position figured bass alignments over notes.
   This engraver creates the following layout object(s):
   BassFigureAlignmentPositioning (page 539).

Fingering_column_engraver (page 466)
   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 599).

Font_size_engraver (page 466)
   Put fontSize into font-size grob property.
   Properties (read)

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

Grob_pq_engraver (page 470)
   Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)
\begin{itemize}
\item \texttt{busyGrobs (list)}
  \begin{itemize}
  \item A queue of \texttt{(end-moment . grob) cons cells}. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g., note heads, spanners, etc.).
  \end{itemize}
\end{itemize}

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

\texttt{Instrument\_name\_engraver (page 471)}
Create a system start text for instrument or vocal names.

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

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

\texttt{shortInstrumentName (markup)}
See \texttt{instrumentName}.

\texttt{shortVocalName (markup)}
Name of a vocal line, short version.

\texttt{vocalName (markup)}
Name of a vocal line.

This engraver creates the following layout object(s): \texttt{InstrumentName} (page 612).

\texttt{Key\_engraver (page 473)}
Engrave a key signature.

Music types accepted: \texttt{key\_change\_event (page 53)}.

Properties (read)
\begin{itemize}
\item \texttt{createKeyOnClefChange (boolean)}
  \begin{itemize}
  \item Print a key signature whenever the clef is changed.
  \end{itemize}
\item \texttt{explicitKeySignatureVisibility (vector)}
  \begin{itemize}
  \item \texttt{‘break\_visibility’} function for explicit key changes. \texttt{\override \break\_visibility} of the \texttt{break\_visibility} property will set the visibility for normal (i.e., at the start of the line) key signatures.
  \end{itemize}
\item \texttt{extraNatural (boolean)}
  \begin{itemize}
  \item Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.
  \end{itemize}
\item \texttt{forbidBreak (boolean)}
  \begin{itemize}
  \item If set to \texttt{#t}, prevent a line break at this point, except if explicitly requested by the user.
  \end{itemize}
\item \texttt{forceBreak (boolean)}
  \begin{itemize}
  \item Set to \texttt{#t} when an event forcing a line break was heard.
  \end{itemize}
\end{itemize}
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 616),
and KeySignature (page 619).

Ledger_line_engraver (page 475)
   Create the spanner to draw ledger lines, and notices objects that need ledger lines.
   This engraver creates the following layout object(s): LedgerLineSpanner
   (page 624).

Merge_mmrest_numbers_engraver (page 479)
   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 481)
   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 672).

Ottava_spanner_engraver (page 483)
   Create a text spanner when the ottavation property changes.
   Music types accepted: ottava-event (page 55),
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 655).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Piano_pedal_align_engraver (page 486)
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 683), SustainPedalLineSpanner (page 701), and
UnaCordaPedalLineSpanner (page 730).

Piano_pedal_engraver (page 486)
Engrave piano pedal symbols and brackets.
Music types accepted: sostenuto-event (page 58), sustain-event (page 59), and
una-corda-event (page 60),

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.
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pedalUnaCordaStyle (symbol)
   See pedalSustainStyle.

This engraver creates the following layout object(s): PianoPedalBracket (page 663), SostenutoPedal (page 682), SustainPedal (page 700), and UnaCordaPedal (page 728).

Pure_from_neighbor_engraver (page 487)
   Coordinates items that get their pure heights from their neighbors.

Rest_collision_engraver (page 488)
   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 670).

Script_row_engraver (page 489)
   Determine order in horizontal side position elements.
   This engraver creates the following layout object(s): ScriptRow (page 672).

Separating_line_group_engraver (page 489)
   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 691).

Signum_repetitionis_engraver (page 490)
   Create a SignumRepetitionis at the end of a \repeat volta section.
   Music types accepted: volta-repeat-end-event (page 61),
   This engraver creates the following layout object(s): SignumRepetitionis (page 676).

Skip_typesetting_engraver (page 490)
   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 687).

Staff_collecting_engraver (page 492)
   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 493)
Highlights music passages.
Music types accepted: staff-highlight-event (page 58),

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 690).

Staff_symbol_engraver (page 493)
Create the constellation of five (default) staff lines.
Music types accepted: staff-span-event (page 58),
This engraver creates the following layout object(s): StaffSymbol (page 691).

Time_signature_engraver (page 498)
Create a Section 3.1.147 [TimeSignature], page 718, whenever timeSignatureFraction changes.
Music types accepted: time-signature-event (page 60),

Properties (read)

initialTimeSignatureVisibility (vector)
break visibility for the initial time signature.

partialBusy (boolean)
Signal that \partial acts at the current timestep.

timeSignatureFraction (positive, finite fraction, as pair)
A pair of numbers, signifying the time signature. For example, \( (4 \cdot 4) \) is a 4/4 time signature.

This engraver creates the following layout object(s): TimeSignature (page 718).

2.1.28 PetrucciVoice
A kind of Voice approximating the mensural typesetting of Ottaviano Petrucci’s *Harmonices Musices Odhecaton* (Venice, 1501).

This context also accepts commands for the following context(s): Voice (page 433).

This context creates the following layout object(s): Arpeggio (page 529), Beam (page 542), BendAfter (page 545), BreathingSign (page 550), ClusterSpanner (page 563), ClusterSpannerBeacon (page 564), CombineTextScript (page 566), Dots (page 582), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner (page 592), FingerGlideSpanner (page 595), Fingering (page 597), Flag (page 599), Glissando (page 603), Hairpin (page 607), InstrumentSwitch (page 613), LaissezVibrerTie (page 623), LaissezVibrerTieColumn (page 624), MensuralLigature (page 640), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), NoteColumn (page 651), NoteHead (page 652), NoteSpacing (page 654), PercentRepeat (page 658), PercentRepeatCounter (page 660), PhrasingSlur (page 661), RepeatSlash (page 666), RepeatTie (page 667), RepeatTieColumn (page 668), Rest (page 669), Script
This context sets the following properties:

- Set context property `autoBeaming` to `#f`.
- Set grob property `length` in `Stem` (page 693), to 5.
- Set grob property `style` in `NoteHead` (page 652), to `petrucci`.
- Set grob property `style` in `Rest` (page 669), to `mensural`.
- Set grob property `thickness` in `Stem` (page 693), 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 446)
  Generate an Arpeggio symbol.
  Music types accepted: arpeggio-event (page 50),
  This engraver creates the following layout object(s): Arpeggio (page 529).

- **Auto_beam_engraver** (page 446)
  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 494, properties `stemLeftBeamCount` and `stemRightBeamCount`.
  Music types accepted: beam-forbid-event (page 51),
  Properties (read)
  ```
  autoBeaming (boolean)
  If set to `#t` then beams are generated automatically. If set to `#f`, auto-
  beaming is switched off as soon as the current beam (if any) is finished
  according to the auto-beaming rules.

  baseMoment (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number
  of beamlets, dependent on `maxSubdivideInterval`, between beats at
  multiples of `minSubdivideInterval`.
  ```
  This engraver creates the following layout object(s): Beam (page 542).
Beam_engraver (page 451)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted: beam-event (page 50),
Properties (read)
  baseMoment (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Bend_engraver (page 453)
Create fall spanners.
Music types accepted: bend-after-event (page 51),
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 545).

Breathing_sign_engraver (page 454)
Notate breath marks.
Music types accepted: breathing-event (page 51),
Properties (read)
  breathMarkType (symbol)
  The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 550).

Chord_tremolo_engraver (page 456)
Generate beams for tremolo repeats.
Music types accepted: tremolo-span-event (page 60),
This engraver creates the following layout object(s): Beam (page 542).

Cluster_spanner_engraver (page 457)
Engrave a cluster using Spanner notation.
Music types accepted: cluster-note-event (page 51),
This engraver creates the following layout object(s): ClusterSpanner (page 563),
and ClusterSpannerBeacon (page 564).

Dots_engraver (page 462)
Create Section 3.1.43 [Dots], page 582, objects for Section 3.2.119
[rhythmic-head-interface], page 801s.
This engraver creates the following layout object(s): Dots (page 582).

Double_percent_repeat_engraver (page 462)
Make double measure repeats.
Music types accepted: double-percent-event (page 52),
Properties (read)
  countPercentRepeats (boolean)
  If set, produce counters for percent repeats.
  measureLength (positive moment with no grace part)
  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 re-
  quested by the user.
This engraver creates the following layout object(s): DoublePercentRepeat (page 583),
and DoublePercentRepeatCounter (page 584).

Dynamic_align_engraver (page 463)
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 589).

Dynamic_engraver (page 464)
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted: absolute-dynamic-event (page 49),
break-dynamic-span-event (page 51), and span-dynamic-event (page 58),
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 590), DynamicTextSpanner (page 592), and Hairpin (page 607).

Finger_glide_engraver (page 466)
Engraver to print a line between two Fingering grobs.
Music types accepted: note-event (page 55),
This engraver creates the following layout object(s): FingerGlideSpanner (page 595).

Fingering_engraver (page 466)
Create fingering scripts.
Music types accepted: fingering-event (page 53),
This engraver creates the following layout object(s): Fingering (page 597).

Font_size_engraver (page 466)
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 467)
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 468)
Engrave glissandi.
Music types accepted: glissando-event (page 53),
Properties (read)

glissandoMap (list)
A map in the form of '((source1 . target1) (source2 . target2) (sourcecn . targettn)) 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 603).

**Grace_auto_beam_engraver** (page 468)  
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 51),

Properties (read)

  autoBeaming (boolean)  
  If set to #t then beams are generated automatically. If set to #f, autobeaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.

This engraver creates the following layout object(s): Beam (page 542).

**Grace_beam_engraver** (page 469)  
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 50),

Properties (read)

  baseMoment (positive moment with no grace part)  
  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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

**Grace_engraver** (page 469)  
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 470)  
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 472)
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 613).

Laissez_vibrer_engraver (page 475)
Create laissez vibrer items.
Music types accepted: laissez-vibrer-event (page 53),
This engraver creates the following layout object(s): LaissezVibrerTie (page 623),
and LaissezVibrerTieColumn (page 624).

Mensural_ligature_engraver (page 479)
Handle Mensural_ligature_events by gluing special ligature heads together.
Music types accepted: 1igature-event (page 54),
This engraver creates the following layout object(s): MensuralLigature (page 640).

Multi_measure_rest_engraver (page 480)
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 642.
Music types accepted: multi-measure-articulation-event (page 54),
multi-measure-rest-event (page 54), and multi-measure-text-event (page 54),
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 bar number. 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 642),
MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), and
MultiMeasureRestText (page 647).

New_fingering_engraver (page 481)
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 597), Script (page 670), StringNumber (page 697), and StrokeFinger (page 699).

Note_head_line_engraver (page 482)
   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 734).

Note_heads_engraver (page 482)
   Generate note heads.

Music types accepted: note-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.

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

This engraver creates the following layout object(s): NoteHead (page 652).

Note_spacing_engraver (page 483)
   Generate NoteSpacing, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s): NoteSpacing (page 654).

Output_property_engraver (page 483)
   Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 50),

Part_combine_engraver (page 485)
   Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted: note-event (page 55), and part-combine-event (page 56),

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 566).

Percent_repeat_engraver (page 485)
Make whole measure repeats.
Music types accepted: percent-event (page 56),
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 658), and PercentRepeatCounter (page 660).

Phrasing_slur_engraver (page 485)
Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 491.
Music types accepted: note-event (page 55), and phrasing-slur-event (page 56),
This engraver creates the following layout object(s): PhrasingSlur (page 661).

Pitched_trill_engraver (page 487)
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s): TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), and TrillPitchParentheses (page 723).

Repeat_tie_engraver (page 488)
Create repeat ties.
Music types accepted: repeat-tie-event (page 56),
This engraver creates the following layout object(s): RepeatTie (page 667), and RepeatTieColumn (page 668).

Rest_engraver (page 488)
Engrave rests.
Music types accepted: rest-event (page 57),
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 669).
Rhythmic_column_engraver (page 489)
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s): NoteColumn (page 651).

Script_column_engraver (page 489)
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 672).

Script_engraver (page 489)
Handle note scripted articulations.
Music types accepted: articulation-event (page 50),
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 670).

Slash_repeat_engraver (page 490)
Make beat repeats.
Music types accepted: repeat-slash-event (page 56),
This engraver creates the following layout object(s): DoubleRepeatSlash (page 586), and RepeatSlash (page 666).

Slur_engraver (page 491)
Build slur grobs from slur events.
Music types accepted: note-event (page 55), and slur-event (page 57),
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 680).

Spanner_break_forbid_engraver (page 492)
Forbid breaks in certain spanners.

Stem_engraver (page 494)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.
Music types accepted: tremolo-event (page 60),
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 599), Stem (page 693), StemStub (page 695), and StemTremolo (page 696).

Text_engraver (page 496)
Create text scripts.
Music types accepted: text-script-event (page 60),
This engraver creates the following layout object(s): TextScript (page 712).

Text_spanner_engraver (page 497)
Create text spanner from an event.
Music types accepted: text-span-event (page 60),
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 714).

Tie_engraver (page 497)
Generate ties between note heads of equal pitch.
Music types accepted: tie-event (page 60),
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 715), and TieColumn (page 717).

Trill_spanner_engraver (page 499)
Create trill spanners.
Music types accepted: trill-span-event (page 60),
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 724).
Tuplet_engraver (page 500)
Catch tuplet events and generate appropriate bracket.
Music types accepted: tuplet-span-event (page 60),
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 725),
and TupletNumber (page 727).

2.1.29 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 138).
This context creates the following layout object(s): Arpeggio (page 529), InstrumentName (page 612),
SpanBar (page 685), SpanBarStub (page 686), StaffGrouper (page 689),
SystemStartBar (page 704), SystemStartBrace (page 705), SystemStartBracket (page 706),
SystemStartSquare (page 707), and VerticalAlignment (page 732).
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 590), to #f.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit
context of type Staff (page 305).
Context PianoStaff can contain ChoirStaff (page 68), ChordNames (page 98),
Devnull (page 111), DrumStaff (page 111), Dynamics (page 129), FiguredBass (page 135),
FretBoards (page 136), GrandStaff (page 138), GregorianTranscriptionLyrics (page 140),
GregorianTranscriptionStaff (page 143), KievanStaff (page 193), Lyrics (page 216),
MensuralStaff (page 219), NoteNames (page 243), OneStaff (page 247),
PetrucciStaff (page 248), PianoStaff (page 273), RhythmicStaff (page 275), Staff (page 305),
StaffGroup (page 318), TabStaff (page 360), VaticanaLyrics (page 383), and
VaticanaStaff (page 409).
This context is built from the following engraver(s):

- Instrument_name_engraver (page 471)
  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 612).

Keep_alive_together engraver (page 473)
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 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Span_arpeggio engraver (page 492)
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 529).

Span_bar engraver (page 492)
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 685).

Span_bar_stub engraver (page 492)
Make stubs for span bars in all contexts that the span bars cross.
This engraver creates the following layout object(s): SpanBarStub (page 686).

System_start_delimiter engraver (page 494)
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 704), SystemStartBrace (page 705), SystemStartBracket (page 706), and SystemStartSquare (page 707).

**Vertical_align_engraver (page 500)**
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 689), and VerticalAlignment (page 732).

### 2.1.30 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 305).

This context creates the following layout object(s): BarLine (page 532), BreathingSign (page 550), CaesuraScript (page 553), DotColumn (page 581), InstrumentName (page 612), LedgerLineSpanner (page 624), StaffHighlight (page 690), StaffSpacing (page 691), StaffSymbol (page 691), TimeSignature (page 718), and VerticalAxisGroup (page 732).

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 691), to 1.
- Set grob property `neutral-direction` in Beam (page 542), to 1.
- Set grob property `neutral-direction` in Stem (page 693), to 1.
- Set grob property `staff-padding` in VoltaBracket (page 735), to 3.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Voice (page 433).

Context RhythmicStaff can contain CueVoice (page 100), NullVoice (page 245), and Voice (page 433).

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

- **Axis_group_engraver (page 447)**
  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 732).

Bar_engraver (page 447)
   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 49), caesura-event (page 51),
   coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52),
   section-event (page 57), and segno-mark-event (page 57),

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 at-
   tached 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 en-
   graver 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 ‘:\ldots:\’.

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 ‘:\ldots:S:\’.

endRepeatBarType (string)
Bar line to insert at the end of a \repeat volta. The default is ‘:|.’.

dendRepeatSegnoBarType (string)
Bar line to insert where an in-staff segno coincides with the end of a \repeat volta. The default is ‘:|.|.’.

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 #t, Bar_engraver forbids line breaks where there is no bar line.

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

printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning of the piece.

printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 532).

Caesura_engraver (page 454)
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 51),

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 at-
  tached 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 en-
  graver 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 550),
and CaesuraScript (page 553).

Dot_column_engraver (page 461)
  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 581).

Font_size_engraver (page 466)
  Put fontSize into font-size grob property.
  Properties (read)
    fontSize (number)
      The relative size of all grobs in a context.

Instrument_name_engraver (page 471)
  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 612).
Ledger_line_engraver (page 475)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s): LedgerLineSpanner (page 624).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Pitch_squash_engraver (page 487)
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 489)
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 691).

Staff_highlight_engraver (page 493)
Highlights music passages.
Music types accepted: staff-highlight-event (page 58),
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 690).

Staff_symbol_engraver (page 493)
Create the constellation of five (default) staff lines.
Music types accepted: staff-span-event (page 58),
This engraver creates the following layout object(s): StaffSymbol (page 691).

Time_signature_engraver (page 498)
Create a Section 3.1.147 [TimeSignature], page 718, whenever timeSignatureFraction changes.
Music types accepted: time-signature-event (page 60),
Properties (read)
  initialTimeSignatureVisibility (vector)
     break visibility for the initial time signature.
  partialBusy (boolean)
     Signal that \partial acts at the current timestep.
timeSignatureFraction (positive, finite 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 718).

2.1.31 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 281).

This context creates the following layout object(s): BarNumber (page 536), BreakAlignGroup (page 548), BreakAlignment (page 549), CenteredBarNumber (page 554), CenteredBarNumberLineSpanner (page 555), CodaMark (page 564), ControlPoint (page 568), ControlPolygon (page 569), Footnote (page 600), GraceSpacing (page 605), JumpScript (page 614), LeftEdge (page 625), MetronomeMark (page 640), NonMusicalPaperColumn (page 649), PaperColumn (page 656), Parentheses (page 657), RehearsalMark (page 664), SectionLabel (page 672), SegnoMark (page 674), SpacingSpanner (page 684), StaffGrouper (page 689), SystemStartBar (page 704), SystemStartBrace (page 705), SystemStartBracket (page 706), SystemStartSquare (page 707), TextMark (page 710), VerticalAlignment (page 732), VoltaBracket (page 735), and VoltaBracketSpanner (page 736).

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 at lily/music-functions.scm:1716:0 (context pitch barnum)>)
- Set context property autoBeamCheck to default-auto-beam-check.
- Set context property autoBeaming to #t.
- Set context property autoCautionaries to '().
- Set context property barChecksSynchronize to #f.
- Set context property barNumberFormatter to robust-bar-number-function.
- Set context property barNumberVisibility to first-bar-number-invisible-and-no-parenthesized-
• Set context property `breathMarkDefinitions` to:

```lisp
'(
  (altcomma
    (text #<procedure musicglyph-markup (layout props glyph-name)> "scripts.raltcomma"))
  (caesura
    (text #<procedure musicglyph-markup (layout props glyph-name)> "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 (grob)>)
    (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 (grob)>)
    (extra-spacing-width -1.0 0.0)
    (stencil
      .
      #<procedure ly:breathing-sign::divisio-minima (_)>)
    (comma (text #<procedure musicglyph-markup (layout props glyph-name)> "scripts.rcomma"))
  (curvedcaesura
    (text #<procedure musicglyph-markup (layout props glyph-name)> "scripts.caesura.curved")
  (outsidecomma
    (outside-staff-priority . 40)
    (text #<procedure musicglyph-markup (layout props glyph-name)> "scripts.caesura.curved")
  (spacer
    (text #<procedure null-markup (layout props)>)
  (tickmark
    (outside-staff-priority . 40)
    (text #<procedure musicglyph-markup (layout props glyph-name)> "scripts.tickmark")
```

(upbow (outside-staff-priority . 40)
  (text #<procedure musicglyph-markup (layout props glyph-name)>
   "scripts.upbow")
)

(varcomma
  (text #<procedure musicglyph-markup (layout props glyph-name)>
   "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 (layout props args)>
    ("+"))
   ((#<Pitch ees' > #<Pitch ges' >)
    #<procedure line-markup (layout props args)>
    ((#<procedure fontsize-markup (layout props increment arg)>
      2
      "x/0")
    ))
   ((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >)
    #<procedure line-markup (layout props args)>
    ((#<procedure super-markup (layout props arg)> "ø")
    ))
   ((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >)
    #<procedure concat-markup (layout props args)>
    ((#<procedure line-markup (layout props args)>
      ((#<procedure fontsize-markup (layout props increment arg)>
        2
        "x/0")
      )
    )
    )
   ((#<Pitch e' > #<Pitch g' >
     #<Pitch b' >
     #<Pitch fis'' >)
    #<procedure line-markup (layout props args)>
    ((#<procedure super-markup (layout props arg)> "lyd")
    ))
   ((#<Pitch e' > #<Pitch g' >
     #<Pitch bes' >
     #<Pitch des'' >
     #<Pitch ees'' >
     #<Pitch fis'' >
     #<Pitch aes'' >)
    #<procedure line-markup (layout props args)>
    ((#<procedure super-markup (layout props arg)> "alt")
    ))
  )
)
• Set context property chordNameFunction to ignatzek-chord-names.
• Set context property chordNameLowercaseMinor to #f.
• Set context property chordNameSeparator to:
  '((#<procedure hspace-markup (layout props amount)> 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 at lily/translation-functions.scm:222:4 (number context)>.
• 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 doubleRepeatBarType to ":::".
• Set context property doubleRepeatSegnoBarType to "::S:::"
• Set context property drumStyleTable to #$<hash-table>.
• 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")
- 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)
• Set context property **lyricMelismaAlignment** to -1.

• Set context property **majorSevenSymbol** to:

```scheme
'(\#<procedure line-markup (layout props args)>
  (\#<procedure fontsize-markup (layout props increment arg)>
    -3
    (\#<procedure triangle-markup (layout props filled)>
      #f)))))
```

• Set context property **measureBarType** to "\|".

• Set context property **melismaBusyProperties** to:

```scheme
'(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 "m".

• Set context property **noChordSymbol** to "N.C.".

• Set context property **noteNameFunction** to **note-name-markup**.

• Set context property **noteNameSeparator** to "/".

• Set context property **noteToFretFunction** to **determine-frets**.

(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 partCombineTextsOnNote to #t.
• Set context property pedalSostenutoStrings to:
• 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 printTrivialVoltaRepeats to #f.
• 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 at
  lily/translation-functions.scm:222:4 (number context)>.
• 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 . 180))

(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)
  (outside-staff-priority . 75)
(script-priority . 175)
(direction . 1)
(flageolet
(script-stencil feta "flageolet" . "flageolet")
(padding . 0.2)
(avoid-slur . around)
(direction . 1)
(script-priority . 50))
(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)
(outside-staff-priority . 75)
(script-priority . 175)
(direction . 1))
(henzzeshortfermata
(script-stencil feta "dhenzeshortfermata" . "uhenzzeshortfermata")
(padding . 0.4)
(avoid-slur . around)
(outside-staff-priority . 75)
(script-priority . 175)
(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)
  (outside-staff-priority . 75)
  (script-priority . 175)
  (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" . "rccomma"))

(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)
(outside-staff-priority . 75)
(script-priority . 175)
(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 . 150))
(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 . 180))
(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
• 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 "/".
• 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))))
  ((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)
   (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)))))
  ((9.4)
   (beamExceptions (end (1/32 8 8 8 8 8 8))))
  ((12.4)
   (beamExceptions
    (end (1/32 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 305).

Context Score can contain ChoirStaff (page 68), ChordNames (page 98), Devnull (page 111), DrumStaff (page 111), Dynamics (page 129), FiguredBass (page 135), FretBoards (page 136), GrandStaff (page 138), GregorianTranscriptionLyrics (page 140), GregorianTranscriptionStaff (page 143), KievanStaff (page 193), Lyrics (page 216), MensuralStaff (page 219), NoteNames (page 243), OneStaff (page 247), PetrucciStaff (page 248), PianoStaff (page 273), RhythmicStaff (page 275), Staff (page 305), StaffGroup (page 318), TabStaff (page 360), VaticanaLyrics (page 383), and VaticanaStaff (page 409).

This context is built from the following engraver(s):
Bar_number_engraver (page 450)
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 492. 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 bar number. 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 536), and CenteredBarNumber (page 554).

Beam_collision_engraver (page 451)
Help beams avoid colliding with notes and clefs in other voices.

Break_align_engraver (page 454)
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 548), BreakAlignment (page 549), and LeftEdge (page 625).

Centered_bar_number_align_engraver (page 455)
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 555).

Concurrent_hairpin_engraver (page 459)
Collect concurrent hairpins.

Footnote_engraver (page 467)
Create footnote texts.

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

Grace_spacing_engraver (page 469)
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 605).

Jump_engraver (page 472)
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 492), also needs to be there so that marks appear at the intended Y location.

Music types accepted: ad-hoc-jump-event (page 49), dal-segno-event (page 52), and fine-event (page 52).

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 614).

Mark_engraver (page 476)
   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 492), 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 477). 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 ar-
     guments 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 num-
     ber 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 564),
   RehearsalMark (page 664), SectionLabel (page 672), and SegnoMark (page 674).

Mark_tracking_translator (page 477)
   This translator chooses which marks Mark_engraver should engrave.
   Music types accepted: ad-hoc-mark-event (page 50), coda-mark-event (page 51),
   rehearsal-mark-event (page 56), section-label-event (page 57), and
   segno-mark-event (page 57).

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 479)
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 492.
Music types accepted: tempo-change-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.).

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 640).
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Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Paper_column_engraver (page 484)
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 51), and label-event (page 53),
Properties (read)
forbidBreak (boolean)
If set to #t, prevent a line break at this point, except if explicitly re-quested 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 re-quested 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 649), and PaperColumn (page 656).

Parenthesis_engraver (page 484)
Parenthesize objects whose parenthesize property is #t.
This engraver creates the following layout object(s): Parentheses (page 657).

Repeat_acknowledge_engraver (page 487)
This translator adds entries to repeatCommands for events generated by \repeat volta.
Music types accepted: volta-repeat-end-event (page 61), and volta-repeat-start-event (page 61),
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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.
start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to
perform this 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 490)
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 568), and
ControlPolygon (page 569).

Spacing_engraver (page 491)
Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.
Music types accepted: spacing-section-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.).
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 684).

Spanner_tracking_engraver (page 492)
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 492)
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 494)
This engraver ensures that stanza numbers are neatly aligned.

System_start_delimiter_engraver (page 494)
Create a system start delimitter (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 704), SystemStartBrace (page 705), SystemStartBracket (page 706), and SystemStartSquare (page 707).

Text_mark_engraver (page 496)
Engraves arbitrary textual marks.
Music types accepted: text-mark-event (page 59),
Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): TextMark (page 710).

Timing_translator (page 498)
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 50), bar-check-event (page 50), bar-event (page 50), fine-event (page 52), and partial-event (page 56),
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 (positive moment with no grace part)
Smallest unit of time that will stand on its own as a subdivided section.

currentBarNumber (integer)
Contains the current bar number. This property is incremented at every bar line.

internalBarNumber (integer)
Contains the current bar number. This property is used for internal time-keeping, among others by the Accidental_engraver.

measureLength (positive moment with no grace part)
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 (positive, finite fraction, as pair)
A pair of numbers, signifying the time signature. For example, \( (4 \cdot 4) \) is a 4/4 time signature.

Properties (write)

alternativeNumber (non-negative, exact integer)
When set, the index of the current \( \text{alternative} \) element, starting from one. Not set outside of alternatives. Note the distinction from volta number: an alternative may pertain to multiple volte.

baseMoment (positive moment with no grace part)
Smallest unit of time that will stand on its own as a subdivided section.

currentBarNumber (integer)
Contains the current bar number. This property is incremented at every bar line.

internalBarNumber (integer)
Contains the current bar number. This property is used for internal time-keeping, among others by the Accidental_engraver.

measureLength (positive moment with no grace part)
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 (positive, finite fraction, as pair)
A pair of numbers, signifying the time signature. For example, \( (4 \cdot 4) \) is a 4/4 time signature.

Tweak_engraver (page 500)
Read the \text{tweaks} property from the originating event, and set properties.

Vertical_align_engraver (page 500)
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 689), and VerticalAlignment (page 732).

Volta_engraver (page 501)
Make volta brackets.

Music types accepted: \text{dal-segno-event} (page 52), \text{fine-event} (page 52), and \text{volta-span-event} (page 61),
Properties (read)

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

- **printTrivialVoltaRepeats** (boolean)
  Notate volta-style repeats even when the repeat count is 1.

- **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 return-count**
  End a repeated section. `return-count` is the number of times to go back from this point to the beginning of the section.

- **start-repeat repeat-count**
  Start a repeated section. `repeat-count` is the number of times to perform this 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** (non-negative moment with no grace part)
  The maximum musical length of a VoltaBracket when its musical-length property is not set.
  This property is deprecated; overriding the musical-length property of VoltaBracket is recommended.

This engraver creates the following layout object(s): VoltaBracket (page 735), and VoltaBracketSpanner (page 736).

### 2.1.32 Staff

Handles clefs, bar lines, keys, accidentals. It can contain Voice contexts.

This context creates the following layout object(s): Accidental (page 520), AccidentalCautionary (page 521), AccidentalPlacement (page 522), AccidentalSuggestion (page 523), BarLine (page 532), BassFigure (page 538), BassFigureAlignment (page 538), BassFigureAlignmentPositioning (page 539), BassFigureBracket (page 540), BassFigureContinuation (page 541), BassFigureLine (page 541), BreathingSign (page 550), CaesuraScript (page 553), Clef (page 558), ClefModifier (page 561), CueClef (page 571), CueEndClef (page 574), DotColumn (page 581), FingeringColumn (page 599), InstrumentName (page 612), KeyCancellation (page 616), KeySignature (page 619), LedgerLineSpanner (page 624), NoteCollision (page 650), OttavaBracket (page 655), PianoPedalBracket (page 663), RestCollision (page 670), ScriptColumn (page 672), ScriptRow (page 672), SostenutoPedal (page 682), SostenutoPedalLineSpanner (page 683), StaffEllipsis (page 687), StaffHighlight (page 690), StaffSpacing (page 691), StaffSymbol (page 691), SustainPedal (page 700), SustainPedalLineSpanner (page 701), TimeSignature (page 718), UnaCordaPedal (page 728), UnaCordaPedalLineSpanner (page 730), and VerticalAxisGroup (page 732).
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 433).

Context `Staff` can contain `CueVoice` (page 100), `NullVoice` (page 245), and `Voice` (page 433).

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

- `Accidental_engraver` (page 443)
  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 bar number. This property is used for internal timekeeping, among others by the Accidental-engraver.

keyAlterations (list)
The current key signature. This is an alist containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g., keyAlterations = #*((6 . ,FLAT)).

localAlterations (list)
The key signature at this point in the measure. The format is the same as for keyAlterations, but can also contain ((octave . name) . (alter barnumber . measureposition)) pairs.

Properties (write)

localAlterations (list)
The key signature at this point in the measure. The format is the same as for keyAlterations, but can also contain ((octave . name) . (alter barnumber . measureposition)) pairs.

This engraver creates the following layout object(s): Accidental (page 520), AccidentalCautionary (page 521), AccidentalPlacement (page 522), and AccidentalSuggestion (page 523).

Al teration_glyph_engraver (page 445)
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 447)
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 732).

Bar_engraver (page 447)
  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 49), caesura-event (page 51),
  coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52),
  section-event (page 57), and segno-mark-event (page 57),

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 at-
    tached 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 en-
    graver 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.\.’.

doubleRepeatBarType (string)
Bar line to insert at the end of a \repeat volta. The default is ‘:\.’.

doubleRepeatSegnoBarType (string)
Bar line to insert where an in-staff segno coincides with the end of a \repeat volta. The default is ‘:\.S’.

endRepeatBarType (string)
Bar line to insert at the end of a \repeat volta. The default is ‘:\.’.

einRepeatSegnoBarType (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 #t, Bar_engraver forbids line breaks where there is no bar line.

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

printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning of the piece.

printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 532).

Caesura_engraver (page 454)
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 51),

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 550), and CaesuraScript (page 553).

Clef_engraver (page 456)

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 to a clef. Values of 7 and -7 are common.

clefTranspositionStyle (symbol)

Determines the way the ClefModifier grob of a clef 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 558), and
ClefModifier (page 561).

Collision_engraver (page 457)
  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 650).

Cue_clef_engraver (page 459)
  Determine and set reference point for pitches in cued voices.

Properties (read)

  clefTransposition (integer)
    Add this much extra transposition to a clef. Values of 7 and -7 are com-
mon.

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 to a cue clef. Values of 7 and -7 are
  common.

cueClefTranspositionStyle (symbol)
  Determines the way the ClefModifier grob of a cue clef 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 re-
  quested 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 561),
CueClef (page 571), and CueEndClef (page 574).

Dot_column_engraver (page 461)
  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 581).

Figured_bass_engraver (page 465)
  Make figured bass numbers.
Music types accepted: bass-figure-event (page 50), and rest-event (page 57).

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 538), BassFigureAlignment (page 538), BassFigureBracket (page 540), BassFigureContinuation (page 541), and BassFigureLine (page 541).

Figured_bass_position_engraver (page 466)
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
BassFigureAlignmentPositioning (page 539).

Fingering_column_engraver (page 466)
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 599).

Font_size_engraver (page 466)
Put fontSize into font-size grob property.
Properties (read)

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

Grob_pq_engraver (page 470)
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 471)
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.

tableName (markup)
Name of a vocal line.

This engraver creates the following layout object(s): InstrumentName (page 612).

Key_engraver (page 473)
Engrave a key signature.
Music types accepted: key-change-event (page 53),
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 616), and KeySignature (page 619).

Ledger_line_engraver (page 475)
  Create the spanner to draw ledger lines, and notices objects that need ledger lines.
  This engraver creates the following layout object(s): LedgerLineSpanner (page 624).

Merge_mmrest_numbers_engraver (page 479)
  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 481)
  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 672).

Ottava_spanner_engraver (page 483)
  Create a text spanner when the ottavation property changes.
  Music types accepted: ottava-event (page 55),

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 655).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Piano_pedal_align_engraver (page 486)
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 683), SustainPedalLineSpanner (page 701), and UnaCordaPedalLineSpanner (page 730).

Piano_pedal_engraver (page 486)
Engrave piano pedal symbols and brackets.
Music types accepted: sostenuto-event (page 58), sustain-event (page 59), and una-corda-event (page 60),
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 663), SostenutoPedal (page 682), SustainPedal (page 700), and UnaCordaPedal (page 728).

Pure_from_neighbor_engraver (page 487)
Coordinates items that get their pure heights from their neighbors.

Rest_collision_engraver (page 488)
Handle collisions of rests.
Properties (read)

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

This engraver creates the following layout object(s): 
RestCollision (page 670).

Script\_row\_engraver (page 489)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 672).

Separating\_line\_group\_engraver (page 489)
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 691).

Skip\_typesetting\_engraver (page 490)
Create a StaffEllipsis when skipTypesetting is used.

Properties (read)

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

This engraver creates the following layout object(s): StaffEllipsis (page 687).

Staff\_collecting\_engraver (page 492)
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 493)
Highlights music passages.

Music types accepted: staff-highlight-event (page 58),

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 690).
Staff_symbol_engraver (page 493)
Create the constellation of five (default) staff lines.
Music types accepted: staff-span-event (page 58),
This engraver creates the following layout object(s): StaffSymbol (page 691).

Time_signature_engraver (page 498)
Create a Section 3.1.147 [TimeSignature], page 718, whenever timeSignatureFraction changes.
Music types accepted: time-signature-event (page 60),
Properties (read)

  initialTimeSignatureVisibility (vector)
  break visibility for the initial time signature.

  partialBusy (boolean)
  Signal that \partial acts at the current timestep.

  timeSignatureFraction (positive, finite 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 718).

2.1.33 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 529), InstrumentName (page 612), SpanBar (page 685), SpanBarStub (page 686), StaffGrouper (page 689), SystemStartBar (page 704), SystemStartBrace (page 705), SystemStartBracket (page 706), SystemStartSquare (page 707), and VerticalAlignment (page 732).

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 590), to #f.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Staff (page 305).

Context StaffGroup can contain ChoirStaff (page 68), ChordNames (page 98), Devnull (page 111), DrumStaff (page 111), Dynamics (page 129), FiguredBass (page 135), FretBoards (page 136), GrandStaff (page 138), GregorianTranscriptionLyrics (page 140), GregorianTranscriptionStaff (page 143), KievanStaff (page 193), Lyrics (page 216), MensuralStaff (page 219), NoteNames (page 243), OneStaff (page 247), PetrucciStaff (page 248), PianoStaff (page 273), RhythmicStaff (page 275), Staff (page 305), StaffGroup (page 318), TabStaff (page 360), VaticanaLyrics (page 383), and VaticanaStaff (page 409).

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

  Instrument_name_engraver (page 471)
  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 612).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Span_arpeggio_engraver (page 492)
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 529).

Span_bar_engraver (page 492)
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 685).

Span_bar_stub_engraver (page 492)
Make stubs for span bars in all contexts that the span bars cross.
This engraver creates the following layout object(s): SpanBarStub (page 686).

System_start_delimiter_engraver (page 494)
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 704), SystemStartBrace (page 705), SystemStartBracket (page 706), and SystemStartSquare (page 707).

**Vertical_align_engraver** (page 500)
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 689), and VerticalAlignment (page 732).

### 2.1.34 StandaloneRhythmScore

A Score-level context for use by `\markup \rhythm`.

This context also accepts commands for the following context(s): Score (page 281), and Timing (page 281).

This context creates the following layout object(s): BarNumber (page 536), BreakAlignGroup (page 548), BreakAlignment (page 549), CenteredBarNumber (page 554), CenteredBarNumberLineSpanner (page 555), CodaMark (page 564), ControlPoint (page 568), ControlPolygon (page 569), Footnote (page 600), GraceSpacing (page 605), JumpScript (page 614), LeftEdge (page 625), MetronomeMark (page 640), NonMusicalPaperColumn (page 649), PaperColumn (page 656), Parentheses (page 657), RehearsalMark (page 664), SectionLabel (page 672), SegnoMark (page 674), SpacingSpanner (page 684), StaffGrouper (page 689), SystemStartBar (page 704), SystemStartBrace (page 705), SystemStartBracket (page 706), SystemStartSquare (page 707), TextMark (page 710), VerticalAlignment (page 732), VoltaBracket (page 735), and VoltaBracketSpanner (page 736).

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 at lily/music-functions.scm:1716:0 (context pitch barnum))>
```

- 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 `barPosition` to 'default.
- 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:

```scheme
'((altcomma
   (text #<procedure musicglyph-markup (layout props glyph-name)>
    "scripts.raltcomma"))
(caesura
   (text #<procedure musicglyph-markup (layout props glyph-name)>
    "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 (grob)>)
   (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 (grob)>)
   (extra-spacing-width -1.0 . 0.0)
   (stencil
     .
     #<procedure ly:breathing-sign::divisio-minima (_)>))
   (comma (text #<procedure musicglyph-markup (layout props glyph-name)>
    "scripts.rcomma"))
(curvedcaesura
   (text #<procedure musicglyph-markup (layout props glyph-name)>
    "scripts.caesura.curved"))
(outsidecomma
   (outside-staff-priority . 40)
   (text #<procedure musicglyph-markup (layout props glyph-name)>
    "scripts.rcomma"))
(spacer
   (text #<procedure null-markup (layout props)>))
(tickmark
   (outside-staff-priority . 40)
```
• 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 (layout props args)> ("+"))
  ((#<Pitch ees' > #<Pitch ges' >)
  #<procedure line-markup (layout props args)> ((#<procedure line-markup (layout props args>)
  ((#<procedure fontsize-markup (layout props increment arg)> 2
  "*")))))
  ((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >)
  #<procedure line-markup (layout props args)> ((#<procedure super-markup (layout props arg>)
  "g")))
  ((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >)
  #<procedure concat-markup (layout props args)> ((#<procedure line-markup (layout props args>)
  ((#<procedure fontsize-markup (layout props increment arg)> 2
  "*")))))
  (#<procedure super-markup (layout props arg>) "7")))
  ((#<Pitch e' > #<Pitch g' > #<Pitch b' > #<Pitch fis'' >)
  #<procedure line-markup (layout props args)> ((#<procedure super-markup (layout props arg>)
  "lyd")))
  ((#<Pitch e' > #<Pitch g' > #<Pitch bes' > #<Pitch des'' > #<Pitch ees'' > #<Pitch fis'' > #<Pitch aes'' >)
  #<procedure line-markup (layout props args)> ((#<procedure super-markup (layout props arg>)
  "alt"))))
• Set context property `chordNameFunction` to `ignatzek-chord-names`.
• Set context property `chordNameLowercaseMinor` to `#f`.
• Set context property `chordNameSeparator` to:
  '('#<procedure hspace-markup (layout props amount)> 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 at lily/translation-functions.scm:222:4 (number context)>
• Set context property `completionFactor` to `unity-if-multimeasure`.
• Set context property `crescendoSpanner` to 'hairpin.
• Set context property `codaMarkFormatter` 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>.
• Set context property `endRepeatBarType` to "::."
• Set context property `endRepeatSegnoBarType` to "::S".
• Set context property `explicitClefVisibility` to:
  #(t t t t)
• Set context property `explicitCueClefVisibility` to:
  #(f t t)
• Set context property `explicitKeySignatureVisibility` to:
  #(t 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 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 (layout props args)>
   ((%procedure fontsize-markup (layout props increment arg)>
     -3
     (%procedure triangle-markup (layout props filled)>
      #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 "m".

• Set context property noChordSymbol to "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:
• 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 `printTrivialVoltaRepeats` to `#f`.
• 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 at lily/translation-functions.scm:222:4 (number context)>`.
• 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 . 180))
(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)
(outside-staff-priority . 75)
(script-priority . 175)
(direction . 1))

(flageolet
(script-stencil feta "flageolet" . "flageolet")
(padding . 0.2)
(avoid-slur . around)
(direction . 1)
(script-priority . 50))

(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)
(outside-staff-priority . 75)
(script-priority . 175)
(direction . 1))

(henzeshortfermata
(script-stencil
 feta
"dhenzeshortfermata"
.
"uhenzeshortfermata")
(padding . 0.4)
(avoid-slur . around)
(outside-staff-priority . 75)
(script-priority . 175)
(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)
  (outside-staff-priority . 75)
  (script-priority . 175)
  (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)
"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 . 150))
(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 . 180))
(upmordent
(script-stencil feta "upmordent" . "upmordent")
(padding . 0.2)
(avoid-slur . around)
(direction . 1))
(upprall
(script-stencil feta "upprall" . "upprall")
(padding . 0.2)
• 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 "/".
• 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'>
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 `tieStaffLineLayoutFunction` 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))))
 ((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)
  (beamExceptions (end (1/8 4 4) (1/12 3 3 3))))
 ((4 . 8) (beatStructure 2 2))
 ((6 . 4)
  (beamExceptions (end (1/16 4 4 4 4 4))))
 ((9 . 4)
  (beamExceptions (end (1/32 8 8 8 8 8 8 8))))
 ((12 . 4)
  (beamExceptions
   (end (1/32 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 '#f'.
Set context property `topLevelAlignment` to '#t'.
Set context property `underlyingRepeatBarType` to "||".
Set grob property `common-shortest-duration` in `SpacingSpanner` (page 684), to #<Mom 1/10>.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `StandaloneRhythmStaff` (page 344).

Context `StandaloneRhythmScore` can contain `ChoirStaff` (page 68), `ChordNames` (page 98), `Devnull` (page 111), `DrumStaff` (page 111), `Dynamics` (page 129), `FiguredBass` (page 135), `FretBoards` (page 136), `GrandStaff` (page 138), `GregorianTranscriptionLyrics`
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 492. 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 voltes.

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 bar number. 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 536), and CenteredBarNumber (page 554).

Beam_collision_engraver (page 451)
Help beams avoid colliding with notes and clefs in other voices.

Break_align_engraver (page 454)
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 548), BreakAlignment (page 549), and LeftEdge (page 625).

Centered_bar_number_align_engraver (page 455)
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 555).

Concurrent_hairpin_engraver (page 459)
Collect concurrent hairpins.

Footnote_engraver (page 467)
Create footnote texts.

This engraver creates the following layout object(s): Footnote (page 600).
Grace_spacing_engraver (page 469)
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 605).

Jump_engraver (page 472)
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 492), also needs to be there so that marks appear at the intended Y location.

Music types accepted: ad-hoc-jump-event (page 49), dal-segno-event (page 52), and fine-event (page 52).

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 num-
ber 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 614).

Mark_engraver (page 476)
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 492), 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 477). 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 ar-
guments 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 num-
ber 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 564),
RehearsalMark (page 664), SectionLabel (page 672), and SegnoMark (page 674).
Mark_tracking_translator (page 477)
This translator chooses which marks Mark_engraver should engrave.

Music types accepted: ad-hoc-mark-event (page 50), coda-mark-event (page 51), rehearsal-mark-event (page 56), section-label-event (page 57), and segno-mark-event (page 57),

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 479)
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 492.

Music types accepted: tempo-change-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.).
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 640).

Output_property_engraver (page 483)
    Apply a procedure to any grob acknowledged.
    Music types accepted: apply-output-event (page 50),

Paper_column_engraver (page 484)
    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 51), and label-event (page 53),
    Properties (read)
        forbidBreak (boolean)
            If set to #t, prevent a line break at this point, except if explicitly re-
            quested 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 re-
            quested 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 649), and PaperColumn (page 656).

Parenthesis_engraver (page 484)
    Parenthesize objects whose parenthesize property is #t.
    This engraver creates the following layout object(s): Parentheses (page 657).

Repeat_acknowledge_engraver (page 487)
    This translator adds entries to repeatCommands for events generated by \\repeat
    volta.
    Music types accepted: volta-repeat-end-event (page 61), and
    volta-repeat-start-event (page 61),
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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 490)
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 568), and ControlPolygon (page 569).

Spacing_engraver (page 491)
Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.
Music types accepted: spacing-section-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.).

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 684).

Spanner_tracking_engraver (page 492)
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 492)
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 494)
This engraver ensures that stanza numbers are neatly aligned.

System_start_delimiter_engraver (page 494)
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 704), SystemStartBrace (page 705), SystemStartBracket (page 706), and SystemStartSquare (page 707).

Text_mark_engraver (page 496)
Engraves arbitrary textual marks.

Music types accepted: text-mark-event (page 59),

Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): TextMark (page 710).

Timing_translator (page 498)
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 50), bar-check-event (page 50), bar-event (page 50), fine-event (page 52), and partial-event (page 56),

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 (positive moment with no grace part)
Smallest unit of time that will stand on its own as a subdivided section.

currentBarNumber (integer)
Contains the current bar number. This property is incremented at every bar line.
internalBarNumber (integer)
Contains the current bar number. This property is used for internal time-
keeping, among others by the Accidental_engraver.

measureLength (positive moment with no grace part)
Length of one measure in the current time signature.

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

timeSignatureFraction (positive, finite 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 num-
ber: an alternative may pertain to multiple volte.

baseMoment (positive moment with no grace part)
Smallest unit of time that will stand on its own as a subdivided section.

currentBarNumber (integer)
Contains the current bar number. This property is incremented at every
bar line.

internalBarNumber (integer)
Contains the current bar number. This property is used for internal time-
keeping, among others by the Accidental_engraver.

measureLength (positive moment with no grace part)
Length of one measure in the current time signature.

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

measureStartNow (boolean)
True at the beginning of a measure.

timeSignatureFraction (positive, finite fraction, as pair)
A pair of numbers, signifying the time signature. For example, '4/4' is a 4/4 time signature.

Tweak_engraver (page 500)
Read the tweaks property from the originating event, and set properties.

Vertical_align_engraver (page 500)
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.
Volta_engraver (page 501)
Make volta brackets.

Properties (read)

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

- printTrivialVoltaRepeats (boolean)
  Notate volta-style repeats even when the repeat count is 1.

- 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 return-count
  End a repeated section. `return-count` is the number of times to go back from this point to the beginning of the section.

- start-repeat repeat-count
  Start a repeated section. `repeat-count` is the number of times to perform this 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 (non-negative moment with no grace part)
  The maximum musical length of a VoltaBracket when its musical-length property is not set.

  This property is deprecated; overriding the musical-length property of VoltaBracket is recommended.

This engraver creates the following layout object(s): StaffGrouper (page 689), and VerticalAlignment (page 732).

Volta_bracket (page 535)
VoltaBracketSpanner (page 736).

2.1.35 StandaloneRhythmStaff
A Staff-level context for use by \markup \rhythm.

This context also accepts commands for the following context(s): Staff (page 305), and Staff (page 305).

This context creates the following layout object(s): BarLine (page 532), BreathingSign (page 550), CaesuraScript (page 553), DotColumn (page 581), InstrumentName (page 612), LedgerLineSpanner (page 624), StaffHighlight (page 690), StaffSpacing (page 691), StaffSymbol (page 691), and VerticalAxisGroup (page 732).

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 691), to 0.
• Set grob property line-count in StaffSymbol (page 691), to 1.
• Set grob property neutral-direction in Beam (page 542), to 1.
• Set grob property neutral-direction in Stem (page 693), to 1.
• Set grob property staff-padding in VoltaBracket (page 735), to 3.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type StandaloneRhythmVoice (page 350).

Context StandaloneRhythmStaff can contain CueVoice (page 100), NullVoice (page 245), StandaloneRhythmVoice (page 350), and Voice (page 433).

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

Axis_group_engraver (page 447)
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 732).

Bar_engraver (page 447)
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 49), caesura-event (page 51), coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52), section-event (page 57), and segno-mark-event (page 57).

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 at-
tached 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 en-
graver 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.|:’.

doubleEndRepeatBarType (string)
Bar line to insert at the end of a \repeat volta. The default is ‘:|.’.

doubleEndRepeatSegnoBarType (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 ‘|.’.

doubleFineSegnoBarType (string)
Bar line to insert where an in-staff segno coincides with \fine. The de-
fault is ‘|.S’.

doubleFineStartRepeatSegnoBarType (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 #t, Bar_engraver forbids line breaks where there is no bar line.

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

printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning
of the piece.
printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 532).

Caesura_ engraver (page 454)

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 51),

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 550), and CaesuraScript (page 553).

Dot_column_ engraver (page 461)

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 581).
Font_size_engraver (page 466)
   Put fontSize into font-size grob property.
   Properties (read)
   fontSize (number)
   The relative size of all grobs in a context.

Instrument_name_engraver (page 471)
   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 612).

Ledger_line_engraver (page 475)
   Create the spanner to draw ledger lines, and notices objects that need ledger lines.
   This engraver creates the following layout object(s): LedgerLineSpanner (page 624).

Output_property_engraver (page 483)
   Apply a procedure to any grob acknowledged.
   Music types accepted: apply-output-event (page 50),

Pitch_squash_engraver (page 487)
   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 489)
   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 691).

Staff_highlight_engraver (page 493)
Highlights music passages.
Music types accepted: staff-highlight-event (page 58),
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 690).

Staff_symbol_engraver (page 493)
Create the constellation of five (default) staff lines.
Music types accepted: staff-span-event (page 58),
This engraver creates the following layout object(s): StaffSymbol (page 691).

2.1.36 StandaloneRhythmVoice
A Voice-level context for use by \markup \rhythm.
This context also accepts commands for the following context(s): Voice (page 433).
This context creates the following layout object(s): Arpeggio (page 529), Beam (page 542), BendAfter (page 545), BreathingSign (page 550), ClusterSpanner (page 563), ClusterSpannerBeacon (page 564), CombineTextScript (page 566), Dots (page 582), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner (page 592), FingerGlideSpanner (page 595), Fingering (page 597), Flag (page 599), Glissando (page 603), Hairpin (page 607), InstrumentSwitch (page 613), LaissezVibrerTie (page 623), LaissezVibrerTieColumn (page 624), LigatureBracket (page 627), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), NoteColumn (page 651), NoteHead (page 652), NoteSpacing (page 654), PercentRepeat (page 658), PercentRepeatCounter (page 660), PhrasingSlur (page 661), RepeatSlash (page 666), RepeatTie (page 667), RepeatTieColumn (page 668), Rest (page 669), Script (page 670), ScriptColumn (page 672), Slur (page 680), Stem (page 693), StemStub (page 695), StemTremolo (page 696), StringNumber (page 697), StrokeFinger (page 699), TextScript (page 712), TextSpanner (page 714), Tie (page 715), TieColumn (page 717), TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), TrillPitchParentheses (page 723), TrillSpanner (page 724), TupletBracket (page 725), TupletNumber (page 727), and VoiceFollower (page 734).

This context sets the following properties:
- Set grob property direction in Stem (page 693), 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 446)
Generate an Arpeggio symbol.
Music types accepted: arpeggio-event (page 50),
This engraver creates the following layout object(s): Arpeggio (page 529).
Auto_beam_ engraver (page 446)
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 494, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 51),

Properties (read)

autoBeaming (boolean)
If set to \#t then beams are generated automatically. If set to \#f, auto-beaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.

baseMoment (positive moment with no grace part)
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.

beatHalfMeasure (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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Beam_ engraver (page 451)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

Properties (read)

baseMoment (positive moment with no grace part)
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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Bend_ engraver (page 453)
Create fall spanners.

Music types accepted: bend-after-event (page 51),
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 545).

**Breathing_sign_engraver** (page 454)
Notate breath marks.
Music types accepted: breathing-event (page 51),
Properties (read)

- **breathMarkType** (symbol)
  The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 550).

**Chord_tremolo_engraver** (page 456)
Generate beams for tremolo repeats.
Music types accepted: tremolo-span-event (page 60),
This engraver creates the following layout object(s): Beam (page 542).

**Cluster_spanner_engraver** (page 457)
Engrave a cluster using Spanner notation.
Music types accepted: cluster-note-event (page 51),
This engraver creates the following layout object(s): ClusterSpanner (page 563), and ClusterSpannerBeacon (page 564).

**Dots_engraver** (page 462)
Create Section 3.1.43 [Dots], page 582, objects for Section 3.2.119 [rhythmic-head-interface], page 801s.
This engraver creates the following layout object(s): Dots (page 582).

**Double_percent_repeat_engraver** (page 462)
Make double measure repeats.
Music types accepted: double-percent-event (page 52),
Properties (read)

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

- **measureLength** (positive moment with no grace part)
  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 re-
   quested by the user.

This engraver creates the following layout object(s): DoublePercentRepeat (page 583), and DoublePercentRepeatCounter (page 584).

Dynamic_align_engraver (page 463)
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 589).

Dynamic_engraver (page 464)
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted: absolute-dynamic-event (page 49),
break-dynamic-span-event (page 51), and span-dynamic-event (page 58),
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 590),
DynamicTextSpanner (page 592), and Hairpin (page 607).

Finger_glide_engraver (page 466)
Engraver to print a line between two Fingering grobs.
Music types accepted: note-event (page 55),
This engraver creates the following layout object(s): FingerGlideSpanner (page 595).

Fingering_engraver (page 466)
Create fingering scripts.
Music types accepted: fingering-event (page 53),
This engraver creates the following layout object(s): Fingering (page 597).
Font_size_engraver (page 466)
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 467)
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 re-
    quested by the user.

Glissando_engraver (page 468)
Engrave glissandi.
Music types accepted: glissando-event (page 53),
Properties (read)
  glissandoMap (list)
    A map in the form of '((source1 . target1) (source2 . target2) (sourcec
    . targetn)) showing the glissandi to be drawn for note columns. The value
    '()' will default to '((0 . 0) (1 . 1) (n . n)), where n is the minimal num-
    ber of note-heads in the two note columns between which the glissandi
    occur.

This engraver creates the following layout object(s): Glissando (page 603).

Grace_auto_beam_engraver (page 468)
Generates one autobeam group across an entire grace phrase. As usual, any manual
beaming or \noBeam will block autobeamig, just like setting the context property
‘autoBeaming’ to ##f.
Music types accepted: beam-forbid-event (page 51),
Properties (read)
  autoBeaming (boolean)
    If set to #t then beams are generated automatically. If set to #f, auto-
    beaming is switched off as soon as the current beam (if any) is finished
    according to the auto-beaming rules.

This engraver creates the following layout object(s): Beam (page 542).

Grace_beam_engraver (page 469)
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 50),
Properties (read)
  baseMoment (positive moment with no grace part)
    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, beams of multiple stems may be subdivided by omitting a number
of beamlets, dependent on maxSubdivideInterval, between beats at
multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Grace_engraver (page 469)
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 470)
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

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

Properties (write)

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

Instrument_switch_engraver (page 472)
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 613).

Laissez_vibrer_engraver (page 475)
Create laissez vibrer items.
Music types accepted: \texttt{laissez-vibrer-event} (page 53),
This engraver creates the following layout object(s): LaissezVibrerTie (page 623),
and LaissezVibrerTieColumn (page 624).

Ligature_bracket_engraver (page 475)
Handle Ligature_events by engraving Ligature brackets.
Music types accepted: \texttt{ligature-event} (page 54),
This engraver creates the following layout object(s): LigatureBracket (page 627).
Multi_measure_rest_engraver (page 480)
Engrave multi-measure rests that are produced with ‘R’. It reads measureStartNow and internalBarNumber to determine what number to print over the MultiMeasureRest, page 642.
Music types accepted: multi-measure-articulation-event (page 54), multi-measure-rest-event (page 54), and multi-measure-text-event (page 54).
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 bar number. 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 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), and MultiMeasureRestText (page 647).

New_fingering_engraver (page 481)
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 597), Script (page 670), StringNumber (page 697), and StrokeFinger (page 699).

Note_head_line_engraver (page 482)
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 734).

Note_heads_engraver (page 482)
Generate note heads.
Music types accepted: note-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.

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

This engraver creates the following layout object(s): NoteHead (page 652).

Note_spacing_engraver (page 483)
Generate NoteSpacing, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s): NoteSpacing (page 654).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Part_combine_engraver (page 485)
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted: note-event (page 55), and part-combine-event (page 56),

Properties (read)

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

partCombineTextsOnNote (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

printPartCombineTexts (boolean)
Set ‘Solo’ and ‘A due’ texts in the part combiner?

soloIIText (markup)
The text for the start of a solo for voice ‘two’ when part-combining.

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

This engraver creates the following layout object(s): CombineTextScript (page 566).

Percent_repeat_engraver (page 485)
Make whole measure repeats.
Music types accepted: percent-event (page 56),

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 658), and PercentRepeatCounter (page 660).

**Phrasing_slur_engraver** (page 485)
Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 491.
Music types accepted: note-event (page 55), and phrasing-slur-event (page 56),
This engraver creates the following layout object(s): PhrasingSlur (page 661).

**Pitched_trill_engraver** (page 487)
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s): TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), and TrillPitchParentheses (page 723).

**Repeat_tie_engraver** (page 488)
Create repeat ties.
Music types accepted: repeat-tie-event (page 56),
This engraver creates the following layout object(s): RepeatTie (page 667), and RepeatTieColumn (page 668).

**Rest_engraver** (page 488)
Engrave rests.
Music types accepted: rest-event (page 57),
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 669).

**Rhythmic_column_engraver** (page 489)
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s): NoteColumn (page 651).

**Script_column_engraver** (page 489)
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 672).

**Script_engraver** (page 489)
Handle note scripted articulations.
Music types accepted: articulation-event (page 50),
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 670).

**Slash_repeat_engraver** (page 490)
Make beat repeats.
Music types accepted: repeat-slash-event (page 56),
This engraver creates the following layout object(s): DoubleRepeatSlash (page 586), and RepeatSlash (page 666).

**Slur_engraver** (page 491)
Build slur grobs from slur events.
Music types accepted: note-event (page 55), and slur-event (page 57),
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 680).

**Spanner_break_forbid_engraver** (page 492)
Forbid breaks in certain spanners.

**Stem_engraver** (page 494)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.
Music types accepted: tremolo-event (page 60),
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 599), Stem (page 693), StemStub (page 695), and StemTremolo (page 696).

**Text_engraver** (page 496)
Create text scripts.
Music types accepted: text-script-event (page 60),
This engraver creates the following layout object(s): TextScript (page 712).

**Text_spanner_engraver** (page 497)
Create text spanner from an event.
Music types accepted: text-span-event (page 60),
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 714).
Tie_engraver (page 497)
Generate ties between note heads of equal pitch.
Music types accepted: tie-event (page 60),
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 715), and TieColumn (page 717).

Trill_spanner_engraver (page 499)
Create trill spanners.
Music types accepted: trill-span-event (page 60),
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 724).

Tuplet_engraver (page 500)
Catch tuplet events and generate appropriate bracket.
Music types accepted: tuplet-span-event (page 60),
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 725), and TupletNumber (page 727).

2.1.37 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 305).
This context creates the following layout object(s): BarLine (page 532), BassFigure (page 538), BassFigureAlignment (page 538), BassFigureAlignmentPositioning (page 539),
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 667), to repeat-tie::handle-tab-note-head.
- Set grob property after-line-breaking in Tie (page 715), to tie::handle-tab-note-head.
- Set grob property avoid-note-head in Stem (page 693), to #t.
- Set grob property beam-thickness in Beam (page 542), to 0.32.
- Set grob property beam-thickness in StemTremolo (page 696), to 0.32.
- Set grob property beam-width in StemTremolo (page 696), to stem-tremolo::calc-tab-width.
- Set grob property bound-details.left in Glissando (page 603), to:
  '((attach-dir . 1) (padding . 0.3))
- Set grob property bound-details.right in Glissando (page 603), to:
  '((attach-dir . -1) (padding . 0.3))
- Set grob property control-points in Slur (page 680), to #<unpure-pure-container
  #<procedure at lily/music-functions.scm:2587:16 (grob . rest)>>.
• Set grob property details in Stem (page 693), to:
  '(((lengths 0 0 0 0 0 0)
    (beamed-lengths 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 603), to glissando::calc-tab-extra-dy.
• Set grob property glyph-name in TabNoteHead (page 707), to tab-note-head::calc-glyph-name.
• Set grob property ignore-collision in NoteColumn (page 651), to #t.
• Set grob property length-fraction in Beam (page 542), to 0.62.
• Set grob property length-fraction in StemTremolo (page 696), to #<procedure 7e7934ec7980 at ice-9/eval.scm:333:13 (a)>.
• Set grob property no-stem-extend in Stem (page 693), to #t.
• Set grob property staff-space in StaffSymbol (page 691), to 1.5.
• Set grob property stencil in Arpeggio (page 529), to #f.
• Set grob property stencil in Beam (page 542), to #f.
• Set grob property stencil in Clef (page 558), to clef::print-modern-tab-if-set.
• Set grob property stencil in Dots (page 582), to #f.
• Set grob property stencil in DynamicTextSpanner (page 592), to #f.
• Set grob property stencil in DynamicText (page 590), to #f.
• Set grob property stencil in Flag (page 599), to #f.
• Set grob property stencil in Glissando (page 603), to glissando::draw-tab-glissando.
• Set grob property stencil in Hairpin (page 607), to #f.
• Set grob property stencil in LaissezVibrerTie (page 623), to #f.
• Set grob property stencil in MultiMeasureRestNumber (page 644), to #f.
• Set grob property stencil in MultiMeasureRestScript (page 646), to #f.
• Set grob property stencil in MultiMeasureRestText (page 647), to #f.
• Set grob property stencil in MultiMeasureRest (page 642), to #f.
• Set grob property stencil in PhrasingSlur (page 661), to #f.
• Set grob property stencil in RepeatTie (page 667), to #f.
• Set grob property stencil in Rest (page 669), to #f.
• Set grob property stencil in Script (page 670), to #f.
• Set grob property stencil in StemTremolo (page 696), to #f.
• Set grob property stencil in Stem (page 693), to #f.
• Set grob property stencil in TabNoteHead (page 707), to tab-note-head::whiteout-if-style-set.
• Set grob property stencil in TextScript (page 712), to #f.
• Set grob property stencil in TextSpanner (page 714), to #f.
• Set grob property stencil in Tie (page 715), to #f.
• Set grob property stencil in TimeSignature (page 718), to #f.
• Set grob property stencil in TupletBracket (page 725), to #f.
• Set grob property stencil in TupletNumber (page 727), to \#f.
• Set grob property style in Flag (page 599), 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 372).

Context TabStaff can contain CueVoice (page 100), NullVoice (page 245), and TabVoice (page 372).

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

**Alteration_glyph_engraver** (page 445)
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 447)
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 732).

**Bar_engraver** (page 447)
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 49), caesura-event (page 51), coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52), section-event (page 57), and segno-mark-event (page 57).

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 at-
tached 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 en-
graver 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 de-
fault 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 ‘|.|:’.

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

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

printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning
of the piece.
printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 532).

**Caesura_engraver** (page 454)

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 51),

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 550), and CaesuraScript (page 553).

**Clef_engraver** (page 456)

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 to a clef. Values of 7 and -7 are common.

clefTranspositionStyle (symbol)
    Determines the way the ClefModifier grob of a clef 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 558), and ClefModifier (page 561).

Collision_engraver (page 457)
    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 650).

Cue_clef_engraver (page 459)
    Determine and set reference point for pitches in cued voices.

Properties (read)

clefTransposition (integer)
    Add this much extra transposition to a clef. 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 to a cue clef. Values of 7 and -7 are common.

cueClefTranspositionStyle (symbol)
    Determines the way the ClefModifier grob of a cue clef 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 re-quested 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 561), CueClef (page 571), and CueEndClef (page 574).

Dot_column_engraver (page 461)
   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 581).

Figured_bass_engraver (page 465)
   Make figured bass numbers.
   Music types accepted: bass-figure-event (page 50), and rest-event (page 57),
   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 538),
   BassFigureAlignment (page 538), BassFigureBracket (page 540),
   BassFigureContinuation (page 541), and BassFigureLine (page 541).

Figured_bass_position_engraver (page 466)
   Position figured bass alignments over notes.
   This engraver creates the following layout object(s): BassFigureAlignmentPositioning (page 539).

Fingering_column_engraver (page 466)
   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 599).
Font_size_engraver (page 466)
Put fontSize into font-size grob property.
Properties (read)
  fontSize (number)
  The relative size of all grobs in a context.

Grob_pq_engraver (page 470)
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 471)
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 612).

Ledger_line_engraver (page 475)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s): LedgerLineSpanner
(page 624).

Merge_mmrest_numbers_engraver (page 479)
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 481)
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 672).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Piano_pedal_align_engraver (page 486)
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 683), SustainPedalLineSpanner (page 701), and UnaCordaPedalLineSpanner (page 730).

Piano_pedal_engraver (page 486)
Engrave piano pedal symbols and brackets.
Music types accepted: sostenuto-event (page 58), sustain-event (page 59), and una-corda-event (page 60),
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 663), SostenutoPedal (page 682), SustainPedal (page 700), and UnaCordaPedal (page 728).

Pure_from_neighbor_engraver (page 487)
Coordinates items that get their pure heights from their neighbors.
Rest_collision_engraver (page 488)
Handle collisions of rests.
Properties (read)

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

This engraver creates the following layout object(s): RestCollision (page 670).

Script_row_engraver (page 489)
Determine order in horizontal side position elements.
This engraver creates the following layout object(s): ScriptRow (page 672).

Separating_line_group_engraver (page 489)
Generate objects for computing spacing parameters.
Properties (read)

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

  hasStaffSpacing (boolean)
   True if \(\text{currentCommandColumn}\) contains items that will affect spacing.

This engraver creates the following layout object(s): StaffSpacing (page 691).

Skip_typesetting_engraver (page 490)
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 687).

Staff_collecting_engraver (page 492)
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 493)
Highlights music passages.
Music types accepted: staff-highlight-event (page 58),
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 690).
Staff_symbol_engraver (page 493)
Create the constellation of five (default) staff lines.
Music types accepted: staff-span-event (page 58),
This engraver creates the following layout object(s): StaffSymbol (page 691).

Tab_staff_symbol_engraver (page 496)
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 691).

Time_signature_engraver (page 498)
Create a Section 3.1.147 \[TimeSignature\], page 718, whenever
timeSignatureFraction changes.
Music types accepted: time-signature-event (page 60),
Properties (read)

initialTimeSignatureVisibility (vector)
break visibility for the initial time signature.

partialBusy (boolean)
Signal that \partial acts at the current timestep.

timeSignatureFraction (positive, finite 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 718).

2.1.38 TabVoice
Context for drawing notes in a Tab staff.

This context also accepts commands for the following context(s): Voice (page 433).

This context creates the following layout object(s): Arpeggio (page 529), Beam (page 542),
BendAfter (page 545), BendSpanner (page 546), BreathingSign (page 550), ClusterSpanner
(page 563), ClusterSpannerBeacon (page 564), CombineTextScript (page 566), Dots
(page 582), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584),
DoubleRepeatSlash (page 586), DynamicLineSpanner (page 589), DynamicText
(page 590), DynamicTextSpanner (page 592), FingerGlideSpanner (page 595), Flag
(page 599), Glissando (page 603), Hairpin (page 607), InstrumentSwitch (page 613),
LaissezVibrerTie (page 623), LaissezVibrerTieColumn (page 624), LigatureBracket
(page 627), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644),
MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), NoteColumn
(page 651), NoteSpacing (page 654), PercentRepeat (page 658), PercentRepeatCounter
(page 660), PhrasingSlur (page 661), RepeatSlash (page 666), RepeatTie (page 667),
RepeatTieColumn (page 668), Rest (page 669), Script (page 670), ScriptColumn
(page 672), Slur (page 680), Stem (page 693), StemStub (page 695), StemTremolo (page 696),
TabNoteHead (page 707), TextScript (page 712), TextSpanner (page 714), Tie (page 715),
TieColumn (page 717), TrillSpanner (page 724), TupletBracket (page 725), TupletNumber
(page 727), and VoiceFollower (page 734).

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 446)
Generate an Arpeggio symbol.
Music types accepted: arpeggio-event (page 50),
This engraver creates the following layout object(s): Arpeggio (page 529).

**Auto_beam_engraver** (page 446)
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 494, properties stemLeftBeamCount and stemRightBeamCount.
Music types accepted: beam-forbid-event (page 51),
Properties (read)

  - autoBeaming (boolean)
    If set to $\#t$ then beams are generated automatically. If set to $\#f$, auto-beaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.

  - baseMoment (positive moment with no grace part)
    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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

**Beam_engraver** (page 451)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted: beam-event (page 50),
Properties (read)

  - baseMoment (positive moment with no grace part)
    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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

**Bend_engraver** (page 453)

Create fall spanners.

Music types accepted: bend-after-event (page 51),

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 545).

**Bend_spanner_engraver** (page 453)

Engraver to print a BendSpanner.

Music types accepted: bend-span-event (page 51), note-event (page 55), and string-number-event (page 59),

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 546).

**Breathing_sign_engraver** (page 454)

Notate breath marks.

Music types accepted: breathing-event (page 51),

Properties (read)

- **breathMarkType** (symbol)
  The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 550).
Chord_tremolo_engraver (page 456)
Generate beams for tremolo repeats.
Music types accepted: tremolo-span-event (page 60),
This engraver creates the following layout object(s): Beam (page 542).

Cluster_spanner_engraver (page 457)
Engrave a cluster using Spanner notation.
Music types accepted: cluster-note-event (page 51),
This engraver creates the following layout object(s): ClusterSpanner (page 563),
and ClusterSpannerBeacon (page 564).

Dots_engraver (page 462)
Create Section 3.1.43 [Dots], page 582, objects for Section 3.2.119
[rhythmic-head-interface], page 801s.
This engraver creates the following layout object(s): Dots (page 582).

Double_percent_repeat_engraver (page 462)
Make double measure repeats.
Music types accepted: double-percent-event (page 52),
Properties (read)
  countPercentRepeats (boolean)
  If set, produce counters for percent repeats.
  measureLength (positive moment with no grace part)
  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 re-
  quested by the user.
This engraver creates the following layout object(s): DoublePercentRepeat
(page 583), and DoublePercentRepeatCounter (page 584).

Dynamic_align_engraver (page 463)
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 589).

Dynamic_engraver (page 464)
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted: absolute-dynamic-event (page 49),
brake-dynamic-span-event (page 51), and span-dynamic-event
(page 58),
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 590), DynamicTextSpanner (page 592), and Hairpin (page 607).

Finger_glide_engraver (page 466)
Engraver to print a line between two Fingering grobs.
Music types accepted: note-event (page 55), This engraver creates the following layout object(s): FingerGlideSpanner (page 595).

Font_size_engraver (page 466)
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 467)
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 468)
Engrave glissandi.
Music types accepted: glissando-event (page 53), 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 603).

**Grace_auto_beam_engraver** (page 468)
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or \noBeam will block autobooming, just like setting the context property ‘autoBeaming’ to \#f.

Music types accepted: beam-forbid-event (page 51),

Properties (read)

- autoBeaming (boolean)
  If set to \#t then beams are generated automatically. If set to \#f, autobeaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.

This engraver creates the following layout object(s): Beam (page 542).

**Grace_beam_engraver** (page 469)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engravens beams when we are at grace points in time.

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

Properties (read)

- baseMoment (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

**Grace_engraver** (page 469)
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 470)
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

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

\texttt{Instrument\_switch\_engraver} (page 472)
Create a cue text for taking instrument.
This engraver is deprecated.

Properties (read)

\texttt{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): \texttt{InstrumentSwitch} (page 613).

\texttt{Laissez\_vibrer\_engraver} (page 475)
Create laissez vibrer items.
Music types accepted: \texttt{laissez-vibrer-event} (page 53),
This engraver creates the following layout object(s): \texttt{LaissezVibrerTie} (page 623),
and \texttt{LaissezVibrerTieColumn} (page 624).

\texttt{Ligature\_bracket\_engraver} (page 475)
Handle \texttt{Ligature\_events} by engraving Ligature brackets.
Music types accepted: \texttt{ligature\_event} (page 54),
This engraver creates the following layout object(s): \texttt{LigatureBracket} (page 627).

\texttt{Multi\_measure\_rest\_engraver} (page 480)
Engrave multi-measure rests that are produced with ‘R’. It reads \texttt{measureStartNow}
and \texttt{internalBarNumber} to determine what number to print over the Section 3.1.88
\cite{MultiMeasureRest}, page 642.
Music types accepted: \texttt{multi-measure-articulation-event} (page 54),
\texttt{multi-measure-rest-event} (page 54), and \texttt{multi-measure-text-event} (page 54),

Properties (read)

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

\texttt{internalBarNumber} (integer)
Contains the current bar number. This property is used for internal time-
keeping, among others by the \texttt{Accidental\_engraver}.

\texttt{measureStartNow} (boolean)
True at the beginning of a measure.

\texttt{restNumberThreshold} (number)
If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): \texttt{MultiMeasureRest} (page 642),
\texttt{MultiMeasureRestNumber} (page 644), \texttt{MultiMeasureRestScript} (page 646), and
\texttt{MultiMeasureRestText} (page 647).

\texttt{Note\_head\_line\_engraver} (page 482)
Engrave a line between two note heads in a staff switch if \texttt{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 734).

Note_spacing_engraver (page 483)
   Generate NoteSpacing, an object linking horizontal lines for use in spacing.
   This engraver creates the following layout object(s): NoteSpacing (page 654).

Output_property_engraver (page 483)
   Apply a procedure to any grob acknowledged.
   Music types accepted: apply-output-event (page 50),

Part_combine_engraver (page 485)
   Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
   Music types accepted: note-event (page 55), and part-combine-event (page 56),
   Properties (read)

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

partCombineTextsOnNote (boolean)
   Print part-combine texts only on the next note rather than immediately on rests or skips.

printPartCombineTexts (boolean)
   Set ‘Solo’ and ‘A due’ texts in the part combiner?

soloIIText (markup)
   The text for the start of a solo for voice ‘two’ when part-combining.

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

This engraver creates the following layout object(s): CombineTextScript (page 566).

Percent_repeat_engraver (page 485)
   Make whole measure repeats.
   Music types accepted: percent-event (page 56),
   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 658), and PercentRepeatCounter (page 660).
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Phrasing_slur_engraver (page 485)
- Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 491.
- Music types accepted: note-event (page 55), and phrasing-slur-event (page 56).
- This engraver creates the following layout object(s): PhrasingSlur (page 661).

Repeat_tie_engraver (page 488)
- Create repeat ties.
- Music types accepted: repeat-tie-event (page 56).
- This engraver creates the following layout object(s): RepeatTie (page 667), and RepeatTieColumn (page 668).

Rest_engraver (page 488)
- Engrave rests.
- Music types accepted: rest-event (page 57).
- 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 669).

Rhythmic_column_engraver (page 489)
- Generate NoteColumn, an object that groups stems, note heads, and rests.
- This engraver creates the following layout object(s): NoteColumn (page 651).

Script_column_engraver (page 489)
- 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 672).

Script_engraver (page 489)
- Handle note scripted articulations.
- Music types accepted: articulation-event (page 50).
- 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 670).

Slash_repeat_engraver (page 490)
- Make beat repeats.
- Music types accepted: repeat-slash-event (page 56).
- This engraver creates the following layout object(s): DoubleRepeatSlash (page 586), and RepeatSlash (page 666).

Slur_engraver (page 491)
- Build slur grobs from slur events.
- Music types accepted: note-event (page 55), and slur-event (page 57).
- 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 680).

**Spanner_break_forbid_engraver** (page 492)

Forbid breaks in certain spanners.

**Stem_engraver** (page 494)

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

**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 599), Stem (page 693), StemStub (page 695), and StemTremolo (page 696).

**Tab_note_heads_engraver** (page 495)

Generate one or more tablature note heads from event of type NoteEvent.

**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 707).

Tab_tie_follow_engraver (page 496)
Adjust TabNoteHead properties when a tie is followed by a slur or glissando.

Text_engraver (page 496)
Create text scripts.
Music types accepted: text-script-event (page 60),
This engraver creates the following layout object(s): TextScript (page 712).

Text_spanner_engraver (page 497)
Create text spanner from an event.
Music types accepted: text-span-event (page 60),
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 714).

Tie_engraver (page 497)
Generate ties between note heads of equal pitch.
Music types accepted: tie-event (page 60),
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.
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This engraver creates the following layout object(s): Tie (page 715), and TieColumn (page 717).

**Trill_spanner_ engraver** (page 499)
Create trill spanners.
Music types accepted: trill-span-event (page 60),
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 724).

**Tuplet_ engraver** (page 500)
Catch tuplet events and generate appropriate bracket.
Music types accepted: tuplet-span-event (page 60),
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 725), and TupletNumber (page 727).

### 2.1.39 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 216).

This context creates the following layout object(s): InstrumentName (page 612), LyricExtender (page 629), LyricHyphen (page 629), LyricSpace (page 633), LyricText (page 633), StanzaNumber (page 692), VerticalAxisGroup (page 732), and VowelTransition (page 738).

This context sets the following properties:

- Set context property instrumentName to '( ).
- Set context property lyricRepeatCountFormatter to #<procedure at lily/translation-functions.scm:208:4 (context repeat-count)>.
- Set context property searchForVoice to #f.
- Set context property shortInstrumentName to '( ).
- Set grob property bar-extent in BarLine (page 532), to:
  '(-0.05 . 0.05)
- Set grob property font-series in LyricHyphen (page 629), to 'normal.
- Set grob property font-size in InstrumentName (page 612), to 1.0.
- Set grob property font-size in LyricHyphen (page 629), to -4.
- Set grob property font-size in LyricText (page 633), to -4.
• Set grob property nonstaff-nonstaff-spacing in VerticalAxisGroup (page 732), to:
  '{(basic-distance . 0)
   (minimum-distance . 2.8)
   (padding . 0.2)
   (stretchability . 0))

• Set grob property nonstaff-relatedstaff-spacing in VerticalAxisGroup (page 732), to:
  '{(basic-distance . 5.5)
   (padding . 0.5)
   (stretchability . 1)}

• Set grob property nonstaff-unrelatedstaff-spacing.padding in VerticalAxisGroup (page 732), to 1.5.
• Set grob property remove-empty in VerticalAxisGroup (page 732), to #t.
• Set grob property remove-first in VerticalAxisGroup (page 732), to #t.
• Set grob property self-alignment-Y in InstrumentName (page 612), to #f.
• Set grob property short-bar-extent in BarLine (page 532), to:
  '(-0.05 . 0.05)

• Set grob property staff-affinity in VerticalAxisGroup (page 732), to 1.
• Set grob property stencil in LyricHyphen (page 629), 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 447)
  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 732).

  Extender_engraver (page 465)
  Create lyric extenders.
  Music types accepted: completize-extender-event (page 52), and extender-event (page 52),
  Properties (read)
  extendersOverRests (boolean)
    Whether to continue extenders as they cross a rest.
This engraver creates the following layout object(s): LyricExtender (page 629).

Font_size_engraver (page 466)
Put fontSize into font-size grob property.
Properties (read)

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

Hyphen_engraver (page 471)
Create lyric hyphens, vowel transitions and distance constraints between words.
Music types accepted: hyphen-event (page 53), and vowel-transition-event (page 61),
This engraver creates the following layout object(s): LyricHyphen (page 629),
LyricSpace (page 633), and VowelTransition (page 738).

Instrument_name_engraver (page 471)
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 612).

Lyric_engraver (page 475)
Engrave text for lyrics.
Music types accepted: lyric-event (page 54),
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 633).

Pure_from_neighbor_engraver (page 487)
Coordinates items that get their pure heights from their neighbors.
Stanza_number_engraver (page 494)

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 692).

2.1.40 VaticanaScore

Top-level context replacing Score for Gregorian chant notated in Vaticana style. Compared to Score, it changes the staff line color to red, uses packed spacing, and removes bar numbers.

This context also accepts commands for the following context(s): Score (page 281), and Timing (page 281).

This context creates the following layout object(s): BreakAlignGroup (page 548), BreakAlignment (page 549), CenteredBarNumberLineSpanner (page 555), CodaMark (page 564), ControlPoint (page 568), ControlPolygon (page 569), Footnote (page 600), GraceSpacing (page 605), JumpScript (page 614), LeftEdge (page 625), MetronomeMark (page 640), NonMusicalPaperColumn (page 649), PaperColumn (page 656), Parentheses (page 657), RehearsalMark (page 664), SectionLabel (page 672), SegnoMark (page 674), SpacingSpanner (page 684), StaffGrouper (page 689), SystemStartBar (page 704), SystemStartBrace (page 705), SystemStartBracket (page 706), SystemStartSquare (page 707), TextMark (page 710), VerticalAlignment (page 732), VoltaBracket (page 735), and VoltaBracketSpanner (page 736).

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 at lily/music-functions.scm:1716:0 (context pitch barnum)>)
• 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-
• Set context property beamHalfMeasure to #t.
• Set context property breathMarkDefinitions to:

'((altcomma
  (text #<procedure musicglyph-markup (layout props glyph-name)>
  "scripts.raltcomma"))


(caesura
  (text #<procedure musicglyph-markup (layout props glyph-name)>
    "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 (grob)>)
  (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 (grob)>)
  (extra-spacing-width -1.0 . 0.0)
  (stencil
    .
    #<procedure ly:breathing-sign::divisio-minima (_)>)
)(comma (text #<procedure musicglyph-markup (layout props glyph-name)>
  "scripts.rcomma")
)(curvedcaesura
  (text #<procedure musicglyph-markup (layout props glyph-name)>
    "scripts.caesura.curved")
)(outsidecomma
  (outside-staff-priority . 40)
  (text #<procedure musicglyph-markup (layout props glyph-name)>
    "scripts.rcomma")
)(spacer
  (text #<procedure null-markup (layout props)>)
)(tickmark
  (outside-staff-priority . 40)
  (text #<procedure musicglyph-markup (layout props glyph-name)>
    "scripts.tickmark")
)(upbow (outside-staff-priority . 40)
  (text #<procedure musicglyph-markup (layout props glyph-name)>
    "scripts.upbow")
)(varcomma
  (text #<procedure musicglyph-markup (layout props glyph-name)>
    "scripts.varcomma")
)
• 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 (layout props args)>
  ("+"))

((#<Pitch ees'> #<Pitch ges'> >)
  #procedure line-markup (layout props args)>
  (((#<procedure fontsize-markup (layout props increment arg)> 2
      "*"))))

((#<Pitch ees'> #<Pitch ges'> #<Pitch bes'> )
  #procedure super-markup (layout props arg)>
  "g")

((#<Pitch ees'> #<Pitch ges'> #<Pitch beses'> )
  #procedure concat-markup (layout props args)>
  (((#<procedure fontsize-markup (layout props increment arg)> 2
      "*"))))

((#<procedure super-markup (layout props arg)>
  "7") )

((#<Pitch e' >
  #<Pitch g' >
  #<Pitch b' >
  #<Pitch fis'' >)
  #procedure line-markup (layout props args)>
  (((#<procedure super-markup (layout props arg)>
      "lyd")) )

((#<Pitch e' >
  #<Pitch g' >
  #<Pitch bes' >
  #<Pitch des'' >
  #<Pitch ees'' >
  #<Pitch fis'' >
  #<Pitch aes'' >)
  #procedure line-markup (layout props args)>
  (((#<procedure super-markup (layout props arg)>
      "alt")) )

((#<Pitch g' >)
  #procedure line-markup (layout props args)>
  (((#<procedure super-markup (layout props arg)>
      "5")) )

((#<Pitch g' > #<Pitch c'' >)
  #procedure line-markup (layout props args)>
  (((#<procedure super-markup (layout props arg)>
      "") )

"scripts.rvarcomma")))
• Set context property chordNameFunction to ignatzek-chord-names.
• Set context property chordNameLowercaseMinor to #f.
• Set context property chordNameSeparator to:
  '(#<procedure hspace-markup (layout props amount)> 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 at lily/translation-functions.scm:222:4 (number context)>.
• 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 doubleRepeatBarType to ":::=".
• Set context property doubleRepeatSegnoBarType to "::|.S.|:".
• Set context property drumStyleTable to #<hash-table>.
• 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)
• Set context property lyricMelismaAlignment to -1.
• Set context property majorSevenSymbol to:
  '('#<procedure line-markup (layout props args)>
    (#<procedure fontsize-markup (layout props increment arg)>
        -3
        (#<procedure triangle-markup (layout props filled)> #f))))
• Set 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 "m".
• Set context property noChordSymbol to "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:
• 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 `printTrivialVoltaRepeats` to #f.
• 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 at
  lily/translation-functions.scm:222:4 (number context)>.
• 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 . 180))
(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)
(outside-staff-priority . 75)
(script-priority . 175)
(direction . 1))
(flageolet
(script-stencil feta "flageolet" . "flageolet")
(padding . 0.2)
(avoid-slur . around)
(direction . 1)
(script-priority . 50))
(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)
(outside-staff-priority . 75)
(script-priority . 175)
(direction . 1))
henzeshortfermata
(script-stencil feta
"dhenzeshortfermata"
.
"uhenzeshortfermata")
(padding . 0.4)
(avoid-slur . around)
(outside-staff-priority . 75)
(script-priority . 175)
(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)
(outside-staff-priority 75)
(script-priority 175)
(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)
  (outside-staff-priority . 75)
  (script-priority . 175)
  (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 . 150))
(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 . 180))
(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)
(outside-staff-priority . 75)
(script-priority . 175)
(direction . 1))
(veryshortfermata
(script-stencil
 feta
 "dveryshortfermata"
 .
 "uveryshortfermata")
(padding . 0.4)
(avoid-slur . around)
(outside-staff-priority . 75)
(script-priority . 175)
(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 "/".
• 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: `

• 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))))
  ((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))))
  ((9 . 4)
  (beamExceptions (end (1/32 8 8 8 8 8 8 8 8 8 8 8 8 8))))
  ((12 . 4)
  (beamExceptions (end (1/32 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8))))
  ((5 . 8) (beatStructure 3 2))
  ((8 . 8) (beatStructure 3 3 2))

• Set context property timing to `#f`.
• Set context property timing to `#t`.
• Set context property `topLevelAlignment` to `#t`.
• Set context property `underlyingRepeatBarType` to `"||"`.
• Set grob property `color` in `LedgerLineSpanner` (page 624), to:
  `'(1.0 0.0 0.0)`
• Set grob property `color` in `StaffSymbol` (page 691), to:
  `'(1.0 0.0 0.0)`
• Set grob property `packed-spacing` in `SpacingSpanner` (page 684), to `#t`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `VaticanaStaff` (page 409).

Context `VaticanaScore` can contain `ChoirStaff` (page 68), `ChordNames` (page 98), `Devnull` (page 111), `DrumStaff` (page 111), `Dynamics` (page 129), `FiguredBass` (page 135), `FretBoards` (page 136), `GrandStaff` (page 138), `GregorianTranscriptionLyrics` (page 140), `GregorianTranscriptionStaff` (page 143), `KievanStaff` (page 193), `Lyrics` (page 216), `MensuralStaff` (page 219), `NoteNames` (page 243), `OneStaff` (page 247), `PetrucciStaff` (page 248), `PianoStaff` (page 273), `RhythmicStaff` (page 275), `Staff` (page 305), `StaffGroup` (page 318), `TabStaff` (page 360), `VaticanaLyrics` (page 383), and `VaticanaStaff` (page 409).
This context is built from the following engraver(s):

- **Beam_collision_engraver** (page 451)
  Help beams avoid colliding with notes and clefs in other voices.

- **Break_align_engraver** (page 454)
  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 548), BreakAlignment (page 549), and LeftEdge (page 625).

- **Centered_bar_number_align_engraver** (page 455)
  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 555).

- **Concurrent_hairpin_engraver** (page 459)
  Collect concurrent hairpins.

- **Footnote_engraver** (page 467)
  Create footnote texts.
  This engraver creates the following layout object(s): Footnote (page 600).

- **Grace_spacing_engraver** (page 469)
  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 605).

- **Jump_engraver** (page 472)
  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 492), also needs to be there so that marks appear at the intended Y location.
  Music types accepted: ad-hoc-jump-event (page 49), dal-segno-event (page 52), and fine-event (page 52),
  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 614).

Mark_engraver (page 476)
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 492), 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 477). 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 564), RehearsalMark (page 664), SectionLabel (page 672), and SegnoMark (page 674).

Mark_tracking_translator (page 477)
This translator chooses which marks *Mark_engraver* should engrave.

Music types accepted: ad-hoc-mark-event (page 50), coda-mark-event (page 51), rehearsal-mark-event (page 56), section-label-event (page 57), and segno-mark-event (page 57),

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 479)
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 492.
Music types accepted: tempo-change-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.).

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 640).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Paper_column_engraver (page 484)
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 51), and label-event (page 53),
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 649), and PaperColumn (page 656).

Parenthesis_engraver (page 484)
Parenthesize objects whose parenthesize property is #t.
This engraver creates the following layout object(s): Parentheses (page 657).

Repeat_acknowledge_engraver (page 487)
This translator adds entries to repeatCommands for events generated by \\repeat volta.
Music types accepted: volta-repeat-end-event (page 61), and volta-repeat-start-event (page 61),

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 490)
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 568), and ControlPolygon (page 569).
Spacing_engraver (page 491)
Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.
Music types accepted: spacing-section-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.).
  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 684).

Spanner_tracking_engraver (page 492)
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 492)
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 494)
This engraver ensures that stanza numbers are neatly aligned.

System_start_delimiter_engraver (page 494)
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 704), SystemStartBrace (page 705), SystemStartBracket (page 706), and SystemStartSquare (page 707).
Text_mark_engraver (page 496)
Engraves arbitrary textual marks.
Music types accepted: text-mark-event (page 59),
Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): TextMark (page 710).

Timing translato (page 498)
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 50), bar-check-event (page 50), bar-event (page 50), fine-event (page 52), and partial-event (page 56),
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 (positive moment with no grace part)
Smallest unit of time that will stand on its own as a subdivided section.

currentBarNumber (integer)
Contains the current bar number. This property is incremented at every bar line.

internalBarNumber (integer)
Contains the current bar number. This property is used for internal time-keeping, among others by the Accidental_engraver.

measureLength (positive moment with no grace part)
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 (positive, finite 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 (positive moment with no grace part)
Smallest unit of time that will stand on its own as a subdivided section.

currentBarNumber (integer)
Contains the current bar number. This property is incremented at every bar line.
internalBarNumber (integer)
Contains the current bar number. This property is used for internal time-
keeping, among others by the Accidental_engraver.

measureLength (positive moment with no grace part)
Length of one measure in the current time signature.

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

measureStartNow (boolean)
True at the beginning of a measure.

timeSignatureFraction (positive, finite fraction, as pair)
A pair of numbers, signifying the time signature. For example, ' (4 . 4)
is a 4/4 time signature.

Tweak_engraver (page 500)
Read the tweaks property from the originating event, and set properties.

Vertical_align_engraver (page 500)
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 689), and
VerticalAlignment (page 732).

Volta_engraver (page 501)
Make volta brackets.
Music types accepted: dal-segno-event (page 52), fine-event (page 52), and volta-span-event (page 61),
Properties (read)
currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable items (clef, key signature,
etc.).

printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

repeatCommands (list)
A list of commands related to volta-style repeats. In general, each ele-
ment 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 return-count
End a repeated section. return-count is the number of times to go
back from this point to the beginning of the section.
start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 (non-negative moment with no grace part)
The maximum musical length of a VoltaBracket when its musical-length property is not set.
This property is deprecated; overriding the musical-length property of VoltaBracket is recommended.

This engraver creates the following layout object(s): VoltaBracket (page 735), and VoltaBracketSpanner (page 736).

2.1.41 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 305).

This context creates the following layout object(s): Accidental (page 520), AccidentalCautionary (page 521), AccidentalPlacement (page 522), AccidentalSuggestion (page 523), BarLine (page 532), BassFigure (page 538), BassFigureAlignment (page 538), BassFigureAlignmentPositioning (page 539), BassFigureBracket (page 540), BassFigureContinuation (page 541), BassFigureLine (page 541), Clef (page 558), ClefModifier (page 561), CueClef (page 571), CueEndClef (page 574), Custos (page 576), Divisio (page 578), DotColumn (page 581), FingeringColumn (page 599), InstrumentName (page 612), KeyCancellation (page 616), KeyValue (page 619), LedgerLineSpanner (page 624), NoteCollision (page 650), OttavaBracket (page 655), PianoPedalBracket (page 663), RestCollision (page 670), ScriptColumn (page 672), ScriptRow (page 672), SostenutoPedal (page 682), SostenutoPedalLineSpanner (page 683), StaffEllipsis (page 687), StaffHighlight (page 690), StaffSpacing (page 691), StaffSymbol (page 691), SustainPedal (page 700), SustainPedalLineSpanner (page 701), UnaCordaPedal (page 728), UnaCordaPedalLineSpanner (page 730), and VerticalAxisGroup (page 732).

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 at lily/music-functions.scm:1716:0 (context pitch barnum)>)
  
  • 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 printTrivialVoltaRepeats to #t.
• 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 startRepeatBarType to '()'.

(72x783)
• 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 550), to item::extra-spacing-height-including-staff.
• Set grob property extra-spacing-width in BreathingSign (page 550), to : (-1.0 . 0.0)
• Set grob property font-size in BreathingSign (page 550), to -2.
• Set grob property font-size in Divisio (page 578), to -2.
• Set grob property hair-thickness in BarLine (page 532), to 0.65.
• Set grob property ledger-line-thickness in StaffSymbol (page 691), to : (1 . 0)
• Set grob property length-fraction in LedgerLineSpanner (page 624), to 0.9.
• Set grob property line-count in StaffSymbol (page 691), to 4.
• Set grob property neutral-direction in Custos (page 576), to -1.
• Set grob property neutral-position in Custos (page 576), to 3.
• Set grob property space-alist.clef in LeftEdge (page 625), to : (extra-space . 0)
• Set grob property space-alist.custos in BarLine (page 532), to : (minimum-space . 0.7)
• Set grob property space-alist.first-note in Clef (page 558), to : (minimum-fixed-space . 1.4)
• Set grob property space-alist.right-edge in Custos (page 576), to : (extra-space . 0)
• Set grob property style in Custos (page 576), to 'vaticana.
• Set grob property style in Dots (page 582), to 'vaticana.
• Set grob property thick-thickness in BarLine (page 532), to 1.8.
• Set grob property thickness in BreathingSign (page 550), to 1.3.
• Set grob property thickness in Divisio (page 578), to 1.3.
• Set grob property thickness in StaffSymbol (page 691), to 0.5.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type VaticanaVoice (page 423).

Context VaticanaStaff can contain CueVoice (page 100), NullVoice (page 245), and VaticanaVoice (page 423).

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

Accidental_engraver (page 443)
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 bar number. 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 520), AccidentalCautionary (page 521), AccidentalPlacement (page 522), and AccidentalSuggestion (page 523).

Alteration_glyph_engraver (page 445)
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 447)
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 732).

Bar_engraver (page 447)
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 49), caesura-event (page 51), coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52), section-event (page 57), and segno-mark-event (page 57).

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 at-
tached 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 en-
graver 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.|:'.

doubleRepeatSegnoBarType (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 de-
fault 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 #t, Bar_engraver forbids line breaks where there is no bar line.

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

printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning
of the piece.
printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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 532).

Clef_ engraver (page 456)
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 to a clef. Values of 7 and -7 are common.
  clefTranspositionStyle (symbol)
      Determines the way the ClefModifier grob of a clef 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 558), and ClefModifier (page 561).

Collision_ engraver (page 457)
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 650).

Cue_clef_ engraver (page 459)
Determine and set reference point for pitches in cued voices.
Properties (read)
  clefTransposition (integer)
      Add this much extra transposition to a clef. 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 to a cue clef. Values of 7 and -7 are common.
cueClefTranspositionStyle (symbol)
Determines the way the ClefModifier grob of a cue clef 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 561), CueClef (page 571), and CueEndClef (page 574).

Custos_engraver (page 460)
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 576).

Divisio_engraver (page 461)
Create divisiones: chant notation for points of breathing or caesura.
Music types accepted: caesura-event (page 51), fine-event (page 52), section-event (page 57), volta-repeat-end-event (page 61), and volta-repeat-start-event (page 61),
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 578).

Dot_column_engraver (page 461)
- 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 581).

Figured_bass_engraver (page 465)
- Make figured bass numbers.
- Music types accepted: bass-figure-event (page 50), and rest-event (page 57),
- 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 538),
  BassFigureAlignment (page 538), BassFigureBracket (page 540),
  BassFigureContinuation (page 541), and BassFigureLine (page 541).

Figured_bass_position_engraver (page 466)
- Position figured bass alignments over notes.
- This engraver creates the following layout object(s):
  BassFigureAlignmentPositioning (page 539).

Fingering_column_engraver (page 466)
- 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 599).

Font_size_engraver (page 466)
- Put fontSize into font-size grob property.
Properties (read)

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

Grob_pq_engraver (page 470)
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

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

Properties (write)

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

Instrument_name_engraver (page 471)
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 \texttt{instrumentName} property labels the staff in the first system, and the \texttt{shortInstrumentName} property labels following lines.

shortInstrumentName (markup)
See \texttt{instrumentName}.

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

vocalName (markup)
Name of a vocal line.

This engraver creates the following layout object(s): \texttt{InstrumentName} (page 612).

Key_engraver (page 473)
Engrave a key signature.
Music types accepted: \texttt{key-change-event} (page 53),
Properties (read)

createKeyOnClefChange (boolean)
Print a key signature whenever the clef is changed.

explicitKeySignatureVisibility (vector)
\texttt{'break-visibility'} function for explicit key changes. \texttt{\override} of the \texttt{break-visibility} property will set the visibility for normal (i.e., at the start of the line) key signatures.

extraNatural (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.
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 616), and KeySignature (page 619).

Ledger_line_engraver (page 475)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s): LedgerLineSpanner (page 624).

Merge_mmrest_numbers_engraver (page 479)
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 481)
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 672).

Ottava_spanner_engraver (page 483)
Create a text spanner when the ottavation property changes.
Music types accepted: ottava-event (page 55),
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 655).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Piano_pedal_align_engraver (page 486)
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 683), SustainPedalLineSpanner (page 701), and UnaCordaPedalLineSpanner (page 730).

Piano_pedal_engraver (page 486)
Engrave piano pedal symbols and brackets.
Music types accepted: sostenuto-event (page 58), sustain-event (page 59), and una-corda-event (page 60),
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.
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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 663), SostenutoPedal (page 682), SustainPedal (page 700), and UnaCordaPedal (page 728).

Pure_from_neighbor_engraver (page 487)
Coordinates items that get their pure heights from their neighbors.

Rest_collision_engraver (page 488)
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 670).

Script_row_engraver (page 489)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 672).

Separating_line_group_engraver (page 489)
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 691).

Skip_typesetting_engraver (page 490)
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 687).

Staff_collecting_engraver (page 492)
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 493)
Highlights music passages.
Music types accepted: staff-highlight-event (page 58),

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 690).

Staff_symbol_engraver (page 493)
Create the constellation of five (default) staff lines.
Music types accepted: staff-span-event (page 58),

This engraver creates the following layout object(s): StaffSymbol (page 691).

2.1.42 VaticanaVoice
A kind of Voice for typesetting Gregorian chant in a notational style approximating Editio Vaticana.

This context also accepts commands for the following context(s): Voice (page 433).

This context creates the following layout object(s): Arpeggio (page 529), Beam (page 542), BendAfter (page 545), BreathingSign (page 550), ClusterSpanner (page 563), ClusterSpannerBeacon (page 564), CombineTextScript (page 566), DotColumn (page 581), Dots (page 582), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner (page 592), Episema (page 594), FingerGlideSpanner (page 595), Fingering (page 597), Glissando (page 603), Hairpin (page 607), InstrumentSwitch (page 613), LaissezVibrerTie (page 623), LaissezVibrerTieColumn (page 624), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), NoteColumn (page 651), NoteHead (page 652), NoteSpacing (page 654), PercentRepeat (page 658), PercentRepeatCounter (page 660), PhrasingSlur (page 661), RepeatSlash (page 666), RepeatTie (page 667), RepeatTieColumn (page 668), Rest (page 669), Script (page 670), ScriptColumn (page 672), StringNumber (page 697), StrokeFinger (page 699), TextScript (page 712), Tie (page 715), TieColumn (page 717), TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), TrillPitchParentheses (page 723), TrillSpanner (page 724), TupletBracket (page 725), TupletNumber (page 727), VaticanaLigature (page 731), and VoiceFollower (page 734).

This context sets the following properties:

• Set context property autoBeaming to #f.
• Set grob property bound-details.left.padding in Episema (page 594), to 0.05.
• Set grob property bound-details.right.padding in Episema (page 594), to 0.05.
• Set grob property style in NoteHead (page 652), to 'vaticana.punctum.
• Set grob property thickness in Episema (page 594), to 2.5.

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 446)
Generate an Arpeggio symbol.
Music types accepted: arpeggio-event (page 50),
This engraver creates the following layout object(s): Arpeggio (page 529).

Auto_beam_engraver (page 446)
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 494, properties stemLeftBeamCount and stemRightBeamCount.
Music types accepted: beam-forbid-event (page 51),
Properties (read)

autoBeaming (boolean)
If set to #t then beams are generated automatically. If set to #f, auto-
beaming is switched off as soon as the current beam (if any) is finished
according to the auto-beaming rules.

baseMoment (positive moment with no grace part)
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, beams of multiple stems may be subdivided by omitting a number
of beamlets, dependent on maxSubdivideInterval, between beats at
multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Beam_engraver (page 451)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags
instead of beams.
Music types accepted: beam-event (page 50),
Properties (read)

baseMoment (positive moment with no grace part)
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, beams of multiple stems may be subdivided by omitting a number
of beamlets, dependent on maxSubdivideInterval, between beats at
multiples of minSubdivideInterval.
This engraver creates the following layout object(s): Beam (page 542).

Bend_engraver (page 453)
Create fall spanners.
Music types accepted: bend-after-event (page 51),
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 545).

Breathing_sign_engraver (page 454)
Notate breath marks.
Music types accepted: breathing-event (page 51),
Properties (read)
  breathMarkType (symbol)
    The type of BreathingSign to create at \breathe.

This engraver creates the following layout object(s): BreathingSign (page 550).

Chord_tremolo_engraver (page 456)
Generate beams for tremolo repeats.
Music types accepted: tremolo-span-event (page 60),
This engraver creates the following layout object(s): Beam (page 542).

Cluster_spanner_engraver (page 457)
Engrave a cluster using Spanner notation.
Music types accepted: cluster-note-event (page 51),
This engraver creates the following layout object(s): ClusterSpanner (page 563), and ClusterSpannerBeacon (page 564).

Dots_engraver (page 462)
Create Section 3.1.43 [Dots], page 582, objects for Section 3.2.119
[rhythmic-head-interface], page 801s.
This engraver creates the following layout object(s): Dots (page 582).

Double_percent_repeat_engraver (page 462)
Make double measure repeats.
Music types accepted: double-percent-event (page 52),
Properties (read)
  countPercentRepeats (boolean)
    If set, produce counters for percent repeats.
  measureLength (positive moment with no grace part)
    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 583), and DoublePercentRepeatCounter (page 584).

Dynamic_align_engraver (page 463)
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 589).

Dynamic_engraver (page 464)
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted: absolute-dynamic-event (page 49), break-dynamic-span-event (page 51), and span-dynamic-event (page 58).
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 590), DynamicTextSpanner (page 592), and Hairpin (page 607).

Episema_engraver (page 465)
Create an Editio Vaticana-style episema line.
Music types accepted: episema-event (page 52),
This engraver creates the following layout object(s): Episema (page 594).
Finger_glide_engraver (page 466)
Engraver to print a line between two Fingering grobs.
Music types accepted: note-event (page 55),
This engraver creates the following layout object(s): FingerGlideSpanner (page 595).

Fingering_engraver (page 466)
Create fingering scripts.
Music types accepted: fingering-event (page 53),
This engraver creates the following layout object(s): Fingering (page 597).

Font_size_engraver (page 466)
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 467)
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 468)
Engrave glissandi.
Music types accepted: glissando-event (page 53),
Properties (read)
glissandoMap (list)
A map in the form of '((source1 . target1) (source2 . target2) (sourcem . 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 603).

Grace_auto_beam_engraver (page 468)
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 51),
Properties (read)
autoBeaming (boolean)
If set to #t then beams are generated automatically. If set to #f, autobeaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.
This engraver creates the following layout object(s): Beam (page 542).

**Grace_beam_engraver** (page 469)
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 50),

Properties (read)

- baseMoment (positive moment with no grace part)
  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 \texttt{baseMoment}s that are combined to make beats.

- subdivideBeams (boolean)
  If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

**Grace_engraver** (page 469)
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 470)
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 472)
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 613).
Laissez_vibrer_engraver (page 475)
Create laissez vibrer items.
Music types accepted: laissez-vibrer-event (page 53),
This engraver creates the following layout object(s): LaissezVibrerTie (page 623),
and LaissezVibrerTieColumn (page 624).

Multi_measure_rest_engraver (page 480)
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 642.
Music types accepted: multi-measure-articulation-event (page 54),
multi-measure-rest-event (page 54), and multi-measure-text-event (page 54),
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 bar number. 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 642),
MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), and MultiMeasureRestText (page 647).

New_fingering_engraver (page 481)
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 597), Script (page 670), StringNumber (page 697), and StrokeFinger (page 699).

Note_head_line_engraver (page 482)
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 734).

Note_heads_engraver (page 482)
Generate note heads.
Music types accepted: note-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.

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

This engraver creates the following layout object(s): NoteHead (page 652).

Note_spacing_engraver (page 483)
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s): NoteSpacing (page 654).

Output_property_engraver (page 483)
Apply a procedure to any grob acknowledged.
Music types accepted: apply-output-event (page 50),

Part_combine_engraver (page 485)
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted: note-event (page 55), and part-combine-event (page 56),
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 566).

Percent_repeat_engraver (page 485)
Make whole measure repeats.
Music types accepted: percent-event (page 56),
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 658), and PercentRepeatCounter (page 660).

Phrasing_slur_engraver (page 485)
Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 491.
Music types accepted: note-event (page 55), and phrasing-slur-event (page 56),
This engraver creates the following layout object(s): PhrasingSlur (page 661).

Pitched_trill_engraver (page 487)
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s): TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), and TrillPitchParentheses (page 723).

Repeat_tie_engraver (page 488)
Create repeat ties.
Music types accepted: repeat-tie-event (page 56),
This engraver creates the following layout object(s): RepeatTie (page 667), and RepeatTieColumn (page 668).

Rest_engraver (page 488)
Engrave rests.
Music types accepted: rest-event (page 57),
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 669).

Rhythmic_column_engraver (page 489)
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s): NoteColumn (page 651).

Script_column_engraver (page 489)
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 672).

Script_engraver (page 489)
Handle note scripted articulations.
Music types accepted: articulation-event (page 50),
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 670).

**Slash_repeat_engraver** (page 490)

Make beat repeats.

Music types accepted: `repeat-slash-event` (page 56),
This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 586), and `RepeatSlash` (page 666).

**Spanner_break_forbid_engraver** (page 492)

Forbid breaks in certain spanners.

**Text_engraver** (page 496)

Create text scripts.

Music types accepted: `text-script-event` (page 60),
This engraver creates the following layout object(s): `TextScript` (page 712).

**Tie_engraver** (page 497)

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 60),

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 715), and `TieColumn` (page 717).

**Trill_spanner_engraver** (page 499)

Create trill spanners.

Music types accepted: `trill-span-event` (page 60),

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 724).

**Tuplet_engraver** (page 500)

Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 60),

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 725), and TupletNumber (page 727).

Vaticana_ligature_engraver (page 500)
  Handle ligatures by glueing special ligature heads together.
  Music types accepted: ligature-event (page 54), and pes-or-flexa-event (page 56),
  This engraver creates the following layout object(s): DotColumn (page 581), and VaticanaLigature (page 731).

2.1.43 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 529), Beam (page 542), BendAfter (page 545), BreathingSign (page 550), ClusterSpanner (page 563), ClusterSpannerBeacon (page 564), CombineTextScript (page 566), Dots (page 582), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner (page 592), FingerGlideSpanner (page 595), Fingering (page 597), Flag (page 599), Glissando (page 603), Hairpin (page 607), InstrumentSwitch (page 613), LaissezVibrerTie (page 623), LaissezVibrerTieColumn (page 624), LigatureBracket (page 627), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), NoteColumn (page 651), NoteHead (page 652), NoteSpacing (page 654), PercentRepeat (page 658), PercentRepeatCounter (page 660), PhrasingSlur (page 661), RepeatSlash (page 666), RepeatTie (page 667), RepeatTieColumn (page 668), Rest (page 669), Script (page 670), ScriptColumn (page 672), Slur (page 680), Stem (page 693), StemStub (page 695), StemTremolo (page 696), StringNumber (page 697), StrokeFinger (page 699), TextScript (page 712), TextSpanner (page 714), Tie (page 715), TieColumn (page 717), TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), TrillPitchParentheses (page 723), TrillSpanner (page 724), TupletBracket (page 725), TupletNumber (page 727), and VoiceFollower (page 734).

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 446)
  Generate an Arpeggio symbol.
  Music types accepted: arpeggio-event (page 50),
  This engraver creates the following layout object(s): Arpeggio (page 529).

Auto_beam_engraver (page 446)
  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 494, properties stemLeftBeamCount and stemRightBeamCount.
Music types accepted: beam-forbid-event (page 51),
Properties (read)

  autoBeaming (boolean)
  If set to #t then beams are generated automatically. If set to #f, auto-
  beaming is switched off as soon as the current beam (if any) is finished
  according to the auto-beaming rules.

  baseMoment (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number
  of beamlets, dependent on maxSubdivideInterval, between beats at
  multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Beam_engraver (page 451)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags
instead of beams.
Music types accepted: beam-event (page 50),
Properties (read)

  baseMoment (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number
  of beamlets, dependent on maxSubdivideInterval, between beats at
  multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Bend_engraver (page 453)
Create fall spanners.
Music types accepted: bend-after-event (page 51),
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 545).

Breathing_sign_engraver (page 454)
Notate breath marks.
Music types accepted: breathing-event (page 51),
Properties (read)
  breathMarkType (symbol)
  The type of BreathingSign to create at \reathe.

This engraver creates the following layout object(s): BreathingSign (page 550).

Chord_tremolo_engraver (page 456)
Generate beams for tremolo repeats.
Music types accepted: tremolo-span-event (page 60),
This engraver creates the following layout object(s): Beam (page 542).

Cluster_spanner_engraver (page 457)
Engrave a cluster using Spanner notation.
Music types accepted: cluster-note-event (page 51),
This engraver creates the following layout object(s): ClusterSpanner (page 563),
and ClusterSpannerBeacon (page 564).

Dots_engraver (page 462)
Create Section 3.1.43 [Dots], page 582, objects for Section 3.2.119
[rhythmic-head-interface], page 801s.
This engraver creates the following layout object(s): Dots (page 582).

Double_percent_repeat_engraver (page 462)
Make double measure repeats.
Music types accepted: double-percent-event (page 52),
Properties (read)
  countPercentRepeats (boolean)
  If set, produce counters for percent repeats.
  measureLength (positive moment with no grace part)
  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 re-
  quested by the user.
This engraver creates the following layout object(s): DoublePercentRepeat (page 583), and DoublePercentRepeatCounter (page 584).

**Dynamic_align_engraver** (page 463)
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 589).

**Dynamic_engraver** (page 464)
Create hairpins, dynamic texts and dynamic text spanners.
**Music types accepted:** absolute-dynamic-event (page 49), break-dynamic-span-event (page 51), and span-dynamic-event (page 58).
**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 590), DynamicTextSpanner (page 592), and Hairpin (page 607).

**Finger_glide_engraver** (page 466)
Engraver to print a line between two Fingering grobs.
**Music types accepted:** note-event (page 55).
This engraver creates the following layout object(s): FingerGlideSpanner (page 595).

**Fingering_engraver** (page 466)
Create fingering scripts.
**Music types accepted:** fingering-event (page 53).
This engraver creates the following layout object(s): Fingering (page 597).

**Font_size_engraver** (page 466)
Put fontSize into font-size grob property.
**Properties (read)**
- fontSize (number)
  The relative size of all grobs in a context.
Forbid_break_engraver (page 467)

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 re-
quested by the user.

Glissando_engraver (page 468)

Engrave glissandi.

Music types accepted: glissando-event (page 53),

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 num-
er of note-heads in the two note columns between which the glissandi
occur.

This engraver creates the following layout object(s): Glissando (page 603).

Grace_auto_beam_engraver (page 468)

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 51),

Properties (read)

autoBeaming (boolean)
If set to #t then beams are generated automatically. If set to #f, auto-
beaming is switched off as soon as the current beam (if any) is finished
according to the auto-beaming rules.

This engraver creates the following layout object(s): Beam (page 542).

Grace_beam_engraver (page 469)

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 50),

Properties (read)

baseMoment (positive moment with no grace part)
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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Grace_engraver (page 469)
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 470)
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 472)
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 613).

Laissez_vibrer_engraver (page 475)
Create laissez vibrer items.
Music types accepted: laissez-vibrer-event (page 53),
This engraver creates the following layout object(s): LaissezVibrerTie (page 623), and LaissezVibrerTieColumn (page 624).

Ligature_bracket_engraver (page 475)
Handle Ligature_events by engraving Ligature brackets.
Music types accepted: ligature-event (page 54),
This engraver creates the following layout object(s): LigatureBracket (page 627).

Multi_measure_rest_engraver (page 480)
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 642.
Music types accepted: multi-measure-articulation-event (page 54),
multi-measure-rest-event (page 54), and multi-measure-text-event (page 54),
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 bar number. 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 642),
MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), and
MultiMeasureRestText (page 647).

New_fingering_engraver (page 481)
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 597), Script
(page 670), StringNumber (page 697), and StrokeFinger (page 699).

Note_head_line_engraver (page 482)
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 734).

Note_heads_engraver (page 482)
Generate note heads.
Music types accepted: note-event (page 55),
Properties (read)

  middleCPosition (number)
    The place of the middle C, measured in half staff-spaces. Usually deter-
    mined 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 652).

Note_spacing_ engraver (page 483)
   Generate NoteSpacing, an object linking horizontal lines for use in spacing.
   This engraver creates the following layout object(s): NoteSpacing (page 654).

Output_property_ engraver (page 483)
   Apply a procedure to any grob acknowledged.
   Music types accepted: apply-output-event (page 50),

Part_combine_ engraver (page 485)
   Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
   Music types accepted: note-event (page 55), and part-combine-event (page 56),
   Properties (read)
      aDueText (markup)
         Text to print at a unisono passage.
      partCombineTextsOnNote (boolean)
         Print part-combine texts only on the next note rather than immediately on rests or skips.
      printPartCombineTexts (boolean)
         Set ‘Solo’ and ‘A due’ texts in the part combiner?
      soloIIText (markup)
         The text for the start of a solo for voice ‘two’ when part-combining.
      soloText (markup)
         The text for the start of a solo when part-combining.

This engraver creates the following layout object(s): CombineTextScript (page 566).

Percent_repeat_ engraver (page 485)
   Make whole measure repeats.
   Music types accepted: percent-event (page 56),
   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 658), and PercentRepeatCounter (page 660).
Phrasing_slur_engraver (page 485)

Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 491.
Music types accepted: note-event (page 55), and phrasing-slur-event (page 56).
This engraver creates the following layout object(s): PhrasingSlur (page 661).

Pitched_trill_engraver (page 487)

Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s): TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), and TrillPitchParentheses (page 723).

Repeat_tie_engraver (page 488)

Create repeat ties.
Music types accepted: repeat-tie-event (page 56),
This engraver creates the following layout object(s): RepeatTie (page 667), and RepeatTieColumn (page 668).

Rest_engraver (page 488)

Engrave rests.
Music types accepted: rest-event (page 57),
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 669).

Rhythmic_column_engraver (page 489)

Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s): NoteColumn (page 651).

Script_column_engraver (page 489)

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 672).

Script_engraver (page 489)

Handle note scripted articulations.
Music types accepted: articulation-event (page 50),
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 670).

Slash_repeat_engraver (page 490)

Make beat repeats.
Music types accepted: repeat-slash-event (page 56),
This engraver creates the following layout object(s): DoubleRepeatSlash (page 586), and RepeatSlash (page 666).
Slur_engraver (page 491)
Build slur grobs from slur events.
Music types accepted: note-event (page 55), and slur-event (page 57),
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 680).
Spanner_break_forbid_engraver (page 492)
Forbid breaks in certain spanners.
Stem_engraver (page 494)
Create stems, flags and single-stem tremolos. It also works together with the beam
engraver for overriding beaming.
Music types accepted: tremolo-event (page 60),
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 599), Stem
(page 693), StemStub (page 695), and StemTremolo (page 696).
Text_engraver (page 496)
Create text scripts.
Music types accepted: text-script-event (page 60),
This engraver creates the following layout object(s): TextScript (page 712).
Text_spanner_engraver (page 497)
Create text spanner from an event.
Music types accepted: text-span-event (page 60),
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 714).
Tie_engraver (page 497)
Generate ties between note heads of equal pitch.
Music types accepted: tie-event (page 60),
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 715), and TieColumn (page 717).

Trill_spanner_engraver (page 499)
Create trill spanners.
Music types accepted: trill-span-event (page 60),

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 724).

Tuplet_engraver (page 500)
Catch tuplet events and generate appropriate bracket.
Music types accepted: tuplet-span-event (page 60),

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 725), and TupletNumber (page 727).

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 bar number. This property is used for internal timekeeping, among others by the Accidental_engraver.

keyAlterations (list)
The current key signature. This is an alist containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g., keyAlterations = #`((6 . FLAT)).

localAlterations (list)
The key signature at this point in the measure. The format is the same as for keyAlterations, but can also contain ((octave . name) . (alter barnumber . measureposition)) pairs.
Properties (write)

  localAlterations (list)
  The key signature at this point in the measure. The format is the same as for
  keyAlterations, but can also contain ((octave . name) . (alter barnumber .
  measureposition)) pairs.

  This engraver creates the following layout object(s): Accidental (page 520),
  AccidentalCautionary (page 521), AccidentalPlacement (page 522), and
  AccidentalSuggestion (page 523).

  Accidental_ engraver is part of the following context(s) in \layout:
  GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166),
  InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219),
  PetrucciStaff (page 248), Staff (page 305), and VaticanaStaff (page 409).

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 num-
  bers, 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 70), ChordNames (page 98), DrumStaff (page 111), GregorianTranscriptionStaff
  (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179),
  KievanStaff (page 193), MensuralStaff (page 219), NoteNames (page 243), PetrucciStaff
  (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

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 calcu-
  lated 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 522), Ambitus (page 525), AmbitusAccidental (page 527), AmbitusLine (page 527), and AmbitusNoteHead (page 528).

Ambitus_engraver is not part of any context

2.2.4 Arpeggio_engraver

Generate an Arpeggio symbol.

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

This engraver creates the following layout object(s): Arpeggio (page 529).

Arpeggio_engraver is part of the following context(s) in \layout: CueVoice (page 100), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 494, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 51),

Properties (read)

  autoBeaming (boolean)
  If set to #t then beams are generated automatically. If set to #f, auto-beaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.

  baseMoment (positive moment with no grace part)
  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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Auto_beam_engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).
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 732).

Axis_group_engraver is part of the following context(s) in \layout: ChordGrid (page 70), ChordNames (page 98), DrumStaff (page 111), Dynamics (page 129), FiguredBass (page 135), FretBoards (page 136), GregorianTranscriptionLyrics (page 140), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievStaff (page 193), Lyrics (page 216), MensuralStaff (page 219), NoteNames (page 243), OneStaff (page 247), PetrucciStaff (page 248), RhythmicStaff (page 275), Staff (page 305), StandaloneRhythmStaff (page 344), TabStaff (page 360), VaticanaLyrics (page 383), and VaticanaStaff (page 409).

2.2.7 Balloon_engraver

Create balloon texts.

Music types accepted: annotate-output-event (page 50),

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

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 49), caesura-event (page 51),
coda-mark-event (page 51), dal-segno-event (page 52), fine-event (page 52),
section-event (page 57), and segno-mark-event (page 57).

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
caeusura in the music. If the transform function returns this second argument un-
modified, 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 ob-
served. 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 ‘\}:\|\,\|\,\|\,\|\:\:\’.
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 ‘\}:\:\\:\:\\:\’.
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 ‘\:\:\:\:\\’.
fineStartRepeatSegnoBarType (string)
Bar line to insert where an in-staff segno coincides with \fine and the start of a
\repeat volta. The default is ‘\}:\|\,\|\,\|\,\|\:\:\’.
forbidBreakBetweenBarLines (boolean)
If set to #t, Bar_engraver forbids line breaks where there is no bar line.
measureBarType (string)
Bar line to insert at a measure boundary.
printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning of the
piece.
printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.
repeatCommands (list)
A list of commands related to volta-style repeats. In general, each element is a list,
‘\((command args\ldots\)\), but a command with no arguments may be abbreviated to a
symbol; e.g., ‘\((\text{start-repeat})\) may be given as ‘\((\text{start-repeat})\).
end-repeat return-count
   End a repeated section. return-count is the number of times to go back from
   this point to the beginning of the section.

start-repeat repeat-count
   Start a repeated section. repeat-count is the number of times to perform this
   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 nor-
   mally 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 532).

Bar_engraver is part of the following context(s) in \layout: ChordGrid (page 70),
DrumStaff (page 111), Dynamics (page 129), GregorianTranscriptionStaff (page 143),
InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff
(page 193), MensuralStaff (page 219), PetrucciStaff (page 248), RhythmicStaff
(page 275), Staff (page 305), StandaloneRhythmStaff (page 344), TabStaff (page 360), and
VaticanaStaff (page 409).
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 492. 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 bar number. 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 536), and CenteredBarNumber (page 554).
Bar_number_engraver is part of the following context(s) in \layout: Score (page 281), and StandaloneRhythmScore (page 320).

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 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

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 50),

Properties (read)

baseMoment (positive moment with no grace part)
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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

This engraver creates the following layout object(s): Beam (page 542).

Beam_engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), NullVoice (page 245), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).
2.2.12 Beam_performer
Music types accepted: beam-event (page 50),

Beam_performer is part of the following context(s) in \midi: ChordNames (page 98),
CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156),
KievanVoice (page 206), MensuralVoice (page 233), NullVoice (page 245), PetrucciVoice
(page 262), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.13 Beat_engraver
This engraver is just a functionally identical copy of Section 2.2.14 [Beat_performer], page 452,
used for visualising its effects. You can also use it for showcasing the effects of the current
beatStructure.

Music types accepted: articulation-event (page 50), and note-event (page 55),
Properties (read)

\begin{itemize}
  \item barExtraVelocity (integer)
    Extra MIDI velocity added by the `Beat_performer` at the start of each measure.
  \item baseMoment (positive moment with no grace part)
    Smallest unit of time that will stand on its own as a subdivided section.
  \item beatExtraVelocity (integer)
    Extra MIDI velocity added by the `Beat_performer` at the start of each beat.
  \item beatStructure (list)
    List of baseMoments that are combined to make beats.
  \item measurePosition (moment)
    How much of the current measure have we had. This can be set manually to create
    incomplete measures.
  \item timeSignatureFraction (positive, finite fraction, as pair)
    A pair of numbers, signifying the time signature. For example, `(4 . 4)` is a 4/4
time signature.
  \item timing (boolean)
    Keep administration of measure length, position, bar number, etc.? Switch off for
cadenzas.
\end{itemize}

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 ac-
cordance 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 50), and note-event (page 55),
Properties (read)

\begin{itemize}
  \item barExtraVelocity (integer)
    Extra MIDI velocity added by the `Beat_performer` at the start of each measure.
\end{itemize}
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baseMoment (positive moment with no grace part)
    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 (positive, finite 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 51),

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 545).

Bend_engraver is part of the following context(s) in \layout: CueVoice (page 100),
DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206),
MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350),
TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.16 Bend_spanner_engraver

Engraver to print a BendSpanner.

Music types accepted: bend-span-event (page 51), note-event (page 55), and
string-number-event (page 59),

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)

```stringsFretFingerList (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 546).

Bend_spanner_engraver is part of the following context(s) in \layout: TabVoice
(page 372).

### 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 548),
BreakAlignment (page 549), and LeftEdge (page 625).

Break_align_engraver is part of the following context(s) in \layout: ChordGridScore
(page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore
(page 386).

### 2.2.18 Breathing_sign_engraver

Notate breath marks.

Music types accepted: breathing-event (page 51),

Properties (read)

```breathMarkType (symbol)
The type of BreathingSign to create at \breathe.
```

This engraver creates the following layout object(s): BreathingSign (page 550).

Breathing_sign_engraver is part of the following context(s) in \layout: CueVoice
(page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice
(page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice
(page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

### 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 51),

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 550), and CaesuraScript (page 553).

Caesura_engraver is part of the following context(s) in \layout: DrumStaff (page 111), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), RhythmicStaff (page 275), Staff (page 305), StandaloneRhythmStaff (page 344), and TabStaff (page 360).

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 555).

Centered_bar_number_align_engraver is part of the following context(s) in \layout: ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

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 556).

Chord_name_engraver is part of the following context(s) in \layout: ChordNames
(page 98).

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 557).

Chord_square_engraver is part of the following context(s) in \layout: ChordGrid
(page 70).

2.2.23 Chord_tremolo_engraver

Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 60),

This engraver creates the following layout object(s): Beam (page 542).

Chord_tremolo_engraver is part of the following context(s) in \layout: CueVoice
(page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice
(page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice
(page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 to a clef. Values of 7 and -7 are common.
clefTranspositionStyle (symbol)
Determines the way the ClefModifier grob of a clef 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 558), and ClefModifier (page 561).

Clef_engraver is part of the following context(s) in /layout: DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

2.2.25 Cluster_spanner_engraver
Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 51),

This engraver creates the following layout object(s): ClusterSpanner (page 563), and ClusterSpannerBeacon (page 564).

Cluster_spanner_engraver is part of the following context(s) in /layout: CueVoice (page 100), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 650).

Collision_engraver is part of the following context(s) in /layout: DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

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 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 com-
pletion engraver, and the duration to be split.

completionUnit (positive moment with no grace part)
Sub-bar unit of completion.

measureLength (positive moment with no grace part)
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 652), Tie (page 715),
and TieColumn (page 717).

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 57),

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 com-
pletion engraver, and the duration to be split.

completionUnit (positive moment with no grace part)
Sub-bar unit of completion.

measureLength (positive moment with no grace part)
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 669).
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 75), Score (page 281), StandaloneRhythmScore (page 320), and
VaticanaScore (page 386).

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 75), and Score (page 281).

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 to a clef. 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 to a cue clef. Values of 7 and -7 are common.
cueClefTranspositionStyle (symbol)
Determines the way the ClefModifier grob of a cue clef is displayed. Possible val-
ues 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 561), CueClef (page 571), and CueEndClef (page 574).

Cue_clef_engraver is part of the following context(s) in \layout: DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

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 53), and note-event (page 55),

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 70), and ChordNames (page 98).

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 576).
Custos_engraver is part of the following context(s) in \layout: InternalMensuralStaff (page 179), MensuralStaff (page 219), PetrucciStaff (page 248), and VaticanaStaff (page 409).

2.2.34 Divisio_engraver
Create divisiones: chant notation for points of breathing or caesura.

Music types accepted: caesura-event (page 51), fine-event (page 52), section-event (page 57), volta-repeat-end-event (page 61), and volta-repeat-start-event (page 61),
Properties (read)
caesuraType (list)
An alist

((bar-line . bar-type)
(breath . breath-type)
(script . 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 578).
Divisio_engraver is part of the following context(s) in \layout: GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), and VaticanaStaff (page 409).

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 581).
Dot_column_engraver is part of the following context(s) in \layout: DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff
2.2.36 Dots_engraver
Create Section 3.1.43 [Dots], page 582, objects for Section 3.2.119 [rhythmic-head-interface], page 801s.

This engraver creates the following layout object(s): Dots (page 582).

Dots_engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.37 Double_percent_repeat_engraver
Make double measure repeats.

Music types accepted: double-percent-event (page 52),

Properties (read)

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

\measureLength (positive moment with no grace part)
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 583), and DoublePercentRepeatCounter (page 584).

Double_percent_repeat_engraver is part of the following context(s) in \layout: ChordGrid (page 70), CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.38 Drum_note_performer
Play drum notes.

Music types accepted: articulation-event (page 50), note-event (page 55), and tie-event (page 60),

Drum_note_performer is part of the following context(s) in \midi: DrumVoice (page 120).

2.2.39 Drum_notes_engraver
Generate drum note heads.

Music types accepted: note-event (page 55),
Properties (read)

drumStyleTable (hash table)
A hash table which maps drums to layout settings. Predefined values:
The layout style is a hash table, containing the drum-pitches (e.g., the symbol
‘hihat’) as keys, and a list (notehead-style script vertical-position) as values.

This engraver creates the following layout object(s): NoteHead (page 652), and Script
(page 670).

Drum_notes_engraver is part of the following context(s) in \layout: DrumVoice
(page 120).

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 52),

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 587).

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 589).

Dynamic_align_engraver is part of the following context(s) in \layout: CueVoice
(page 100), DrumVoice (page 120), Dynamics (page 129), GregorianTranscriptionVoice
(page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262),
StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and
Voice (page 433).
2.2.42 Dynamic_ engraver

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: absolute-dynamic-event (page 49), break-dynamic-span-event (page 51), and span-dynamic-event (page 58).

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 590), DynamicTextSpanner (page 592), and Hairpin (page 607).

Dynamic_ engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), Dynamics (page 129), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.43 Dynamic_ performer

Music types accepted: absolute-dynamic-event (page 49), crescendo-event (page 52), and decrescendo-event (page 52).

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 98), CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).
2.2.44 **Episema_engraver**

Create an *Editio Vaticana*-style episema line.

- Music types accepted: episema-event (page 52).
- This engraver creates the following layout object(s): Episema (page 594).
- Episema_engraver is part of the following context(s) in \layout:
  - GregorianTranscriptionVoice (page 156), and VaticanaVoice (page 423).

2.2.45 **Extender_engraver**

Create lyric extenders.

- Music types accepted: completize-extender-event (page 52), and extender-event (page 52).
- Properties (read)
  - extendersOverRests (boolean)
    Whether to continue extenders as they cross a rest.

- This engraver creates the following layout object(s): LyricExtender (page 629).
- Extender_engraver is part of the following context(s) in \layout:
  - GregorianTranscriptionLyrics (page 140), Lyrics (page 216), and VaticanaLyrics (page 383).

2.2.46 **Figured_bass_engraver**

Make figured bass numbers.

- Music types accepted: bass-figure-event (page 50), and rest-event (page 57).
- 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 538), BassFigureAlignment (page 538), BassFigureBracket (page 540), BassFigureContinuation (page 541), and BassFigureLine (page 541).
- Figured_bass_engraver is part of the following context(s) in \layout:
  - DrumStaff (page 111), FiguredBass (page 135), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).
2.2.47 Figured_bass_position_engraver

Position figured bass alignments over notes.

This engraver creates the following layout object(s): BassFigureAlignmentPositioning (page 539).

Figured_bass_position_engraver is part of the following context(s) in \layout: 
DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

2.2.48 Finger_glide_engraver

Engraver to print a line between two Fingering grobs.

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

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

Finger_glide_engraver is part of the following context(s) in \layout: 
CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 599).

Fingering_column_engraver is part of the following context(s) in \layout: 
DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

2.2.50 Fingering_engraver

Create fingering scripts.

Music types accepted: fingering-event (page 53),

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

Fingering_engraver is part of the following context(s) in \layout: 
CueVoice (page 100), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), VaticanaVoice (page 423), and Voice (page 433).

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 100), DrumStaff (page 111), DrumVoice (page 120), Dynamics (page 129), FretBoards (page 136), GregorianTranscriptionLyrics (page 140), GregorianTranscriptionStaff (page 143), GregorianTranscriptionVoice (page 156), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), KievanVoice (page 206),
Lyrics (page 216), MensuralStaff (page 219), MensuralVoice (page 233), PetrucciStaff (page 248), PetrucciVoice (page 262), RhythmicStaff (page 275), Staff (page 305), StandaloneRhythmStaff (page 344), StandaloneRhythmVoice (page 350), TabStaff (page 360), TabVoice (page 372), VaticanaLyrics (page 383), VaticanaStaff (page 409), VaticanaVoice (page 423), and Voice (page 433).

2.2.52 Footnote_engraver
Create footnote texts.

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

Footnote_engraver is part of the following context(s) in \layout: ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

2.2.53 Forbid_line_break_engraver
Forbid line breaks when note heads are still playing at some point.

Properties (read)

- busyGrosbs (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 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.54 Fretboard_engraver
Generate fret diagram from one or more events of type NoteEvent.

Music types accepted: fingering-event (page 53), note-event (page 55), and string-number-event (page 59),

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 601).
Fretboard_engraver is part of the following context(s) in \layout: FretBoards (page 136).

2.2.55 Glissando_engraver

Engrave glissandi.

Music types accepted: glissando-event (page 53),

Properties (read)

   glissandoMap (list)
      A map in the form of '(((source1 . target1) (source2 . target2) (source3 . target3))
      showing the glissandi to be drawn for note columns. The value '()' will default to '(((0 . 0) (1 . 1) (n . n)), where n is the minimal number of note-heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s): Glissando (page 603).

Glissando_engraver is part of the following context(s) in \layout: CueVoice (page 100),
GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 autobeamning, just like setting the context property ‘autoBeaming’ to #f.

Music types accepted: beam-forbid-event (page 51),

Properties (read)

   autoBeaming (boolean)
      If set to #t then beams are generated automatically. If set to #f, auto-beaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.

This engraver creates the following layout object(s): Beam (page 542).

Grace_auto_beam_engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).
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 50),

Properties (read)

- `baseMoment` (positive moment with no grace part)
  Smallest unit of time that will stand on its own as a subdivided section.

- `beamMelismaBusy` (boolean)
  Signal if a beam is present.

- `beatStructure` (list)
  List of `baseMoment` s that are combined to make beats.

- `subdivideBeams` (boolean)
  If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `maxSubdivideInterval`, between beats at multiples of `minSubdivideInterval`.

This engraver creates the following layout object(s): Beam (page 542).

Grace_beam_engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 605).

Grace_spacing_engraver is part of the following context(s) in \layout: ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).
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 605).
Grid_chord_name_engraver is part of the following context(s) in \layout: ChordGrid (page 70).

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 606).
Grid_line_span_engraver is not part of any context

2.2.62 Grid_point_engraver
Generate grid points.

Properties (read)
- gridInterval (positive moment with no grace part)
  Interval for which to generate GridPoints.

This engraver creates the following layout object(s): GridPoint (page 607).
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 100), DrumStaff (page 111), DrumVoice (page 120), GregorianTranscriptionStaff (page 143), GregorianTranscriptionVoice (page 156), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), KievanVoice (page 206), MensuralStaff (page 219), MensuralVoice (page 233), NullVoice
2.2.64 **Horizontal_bracket_engraver**

Create horizontal brackets over notes for musical analysis purposes.

- Music types accepted: note-grouping-event (page 55),
- This engraver creates the following layout object(s): HorizontalBracket (page 609), and HorizontalBracketText (page 610).

**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 53), and vowel-transition-event (page 61),
- This engraver creates the following layout object(s): LyricHyphen (page 629), LyricSpace (page 633), and VowelTransition (page 738).

**Hyphen_engraver** is part of the following context(s) in \layout: GregorianTranscriptionLyrics (page 140), Lyrics (page 216), and VaticanaLyrics (page 383).

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 612).

**Instrument_name_engraver** is part of the following context(s) in \layout: ChoirStaff (page 68), DrumStaff (page 111), FretBoards (page 136), GrandStaff (page 138), GregorianTranscriptionLyrics (page 140), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), Lyrics (page 216), MensuralStaff (page 219), PetrucciStaff (page 248), PianoStaff (page 273), RhythmicStaff (page 275), Staff (page 305), StaffGroup (page 318), StandaloneRhythmStaff (page 344), TabStaff (page 360), VaticanaLyrics (page 383), and VaticanaStaff (page 409).
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 613).

`Instrument_switch_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 100), `DrumVoice` (page 120), `GregorianTranscriptionVoice` (page 156), `KievanVoice` (page 206), `MensuralVoice` (page 233), `PetrucciVoice` (page 262), `StandaloneRhythmVoice` (page 350), `TabVoice` (page 372), `VaticanaVoice` (page 423), and `Voice` (page 433).

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 492), also needs to be there so that marks appear at the intended Y location.

Music types accepted: `ad-hoc-jump-event` (page 49), `dal-segno-event` (page 52), and `fine-event` (page 52).

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 re-
  peated 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 614).

Jump_engraver is part of the following context(s) in \layout: ChordGridScore (page 75),
Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

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 273).

2.2.70 Key_engraver
Engrave a key signature.

Music types accepted: key-change-event (page 53),

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 616), and KeySignature (page 619).

Key_performer is part of the following context(s) in \layout: GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), and VaticanaStaff (page 409).

2.2.71 Key_performer
Music types accepted: key-change-event (page 53),

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 111), GregorianTranscriptionStaff (page 143), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), RhythmicStaff (page 275), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

2.2.72 Kievan_ligature_engraver
Handle Kievan_ligature_events by gluing Kievan heads together.
Music types accepted: ligature-event (page 54),

This engraver creates the following layout object(s): KievanLigature (page 622).

Kievan_ligature_engraver is part of the following context(s) in \layout: KievanVoice (page 206).
2.2.73 **Laissez_vibrer_engraver**

Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 53),

This engraver creates the following layout object(s): LaissezVibrerTie (page 623), and LaissezVibrerTieColumn (page 624).

Laissez_vibrer_engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 624).

Ledger_line_engraver is part of the following context(s) in \layout: DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), RhythmicStaff (page 275), Staff (page 305), StandaloneRhythmStaff (page 344), TabStaff (page 360), and VaticanaStaff (page 409).

2.2.75 **Ligature_bracket_engraver**

Handle Ligature_events by engraving Ligature brackets.

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

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

Ligature_bracket_engraver is part of the following context(s) in \layout: CueVoice (page 100), StandaloneRhythmVoice (page 350), TabVoice (page 372), and Voice (page 433).

2.2.76 **Lyric_engraver**

Engrave text for lyrics.

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

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 633).

Lyric_engraver is part of the following context(s) in \layout: GregorianTranscriptionLyrics (page 140), Lyrics (page 216), and VaticanaLyrics (page 383).

2.2.77 **Lyric_performer**

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

Lyric_performer is part of the following context(s) in \midi: GregorianTranscriptionLyrics (page 140), and Lyrics (page 216).
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 61),

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 631).

*Lyric_repeat_count_engraver* is part of the following context(s) in \layout: GregorianTranscriptionLyrics (page 140).

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 492), 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 477). 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 564), RehearsalMark (page 664), SectionLabel (page 672), and SegnoMark (page 674).

Mark_engraver is part of the following context(s) in \layout: ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).
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 75), and Score (page 281).

2.2.81 Mark_tracking_translator

This translator chooses which marks Mark_engraver should engrave.

Music types accepted: ad-hoc-mark-event (page 50), coda-mark-event (page 51), rehearsal-mark-event (page 56), section-label-event (page 57), and segno-mark-event (page 57).

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 75), Score (page 281), StandaloneRhythmScore (page 320), and
VaticanaScore (page 386); in \midi: ChordGridScore (page 75), and Score (page 281).

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 54),
Properties (read)
  currentBarNumber (integer)
    Contains the current bar number. This property is incremented at every bar line.
  currentCommandColumn (graphical (layout) object)
    Grob that is X-parent to all current breakable 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 635).
Measure_counter_engraver is not part of any context

2.2.83 Measure_grouping_engraver

Create MeasureGrouping to indicate beat subdivision.

Properties (read)
  baseMoment (positive moment with no grace part)
    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 637).
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 54),
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 638).
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 #t.

This engraver creates the following layout object(s): MelodyItem (page 639).
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 54),

This engraver creates the following layout object(s): MensuralLigature (page 640).
Mensural_ligature_engraver is part of the following context(s) in \layout:
MensuralVoice (page 233), and PetrucciVoice (page 262).

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 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

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 #t.

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 492.

Music types accepted: tempo-change-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.).

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 640).

Metronome_mark_engraver is part of the following context(s) in layout:
ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

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 111), GregorianTranscriptionStaff (page 143), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), RhythmicStaff (page 275), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

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 642.

Music types accepted: multi-measure-articulation-event (page 54), multi-measure-rest-event (page 54), and multi-measure-text-event (page 54),
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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 bar number. 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 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), and MultiMeasureRestText (page 647).

Multi_measure_rest_engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), standaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 597), Script (page 670), StringNumber (page 697), and StrokeFinger (page 699).

New_fingering_engraver is part of the following context(s) in \layout: CueVoice (page 100), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), standaloneRhythmVoice (page 350), VaticanaVoice (page 423), and Voice (page 433).

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 672).

Non_musical_script_column_engraver is part of the following context(s) in \layout: DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).
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 734).

Note_head_line_engraver is part of the following context(s) in `\layout`: CueVoice (page 100), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.95 **Note_heads_engraver**

Generate note heads.

Music types accepted: note-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.

staffLineLayoutFunction (procedure)

Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s): NoteHead (page 652).

Note_heads_engraver is part of the following context(s) in `\layout`: CueVoice (page 100), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), NullVoice (page 245), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), VaticanaVoice (page 423), and Voice (page 433).

2.2.96 **Note_name_engraver**

Print pitches as words.

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

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 653).

Note_name_engraver is part of the following context(s) in `\layout`: NoteNames (page 243).
2.2.97 Note_performer
Music types accepted: articulation-event (page 50), breathing-event (page 51), note-event (page 55), and tie-event (page 60).

Note_performer is part of the following context(s) in \midi: ChordNames (page 98), CueVoice (page 100), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 654).

Note_spacing_engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.99 Ottava_spanner_engraver
Create a text spanner when the ottavation property changes.

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

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 655).

Ottava_spanner_engraver is part of the following context(s) in \layout: GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), and VaticanaStaff (page 409).

2.2.100 Output_property_engraver
Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 50),

Output_property_engraver is part of the following context(s) in \layout: ChoirStaff (page 68), ChordGrid (page 70), ChordGridScore (page 75), ChordNames (page 98), CueVoice (page 100), DrumStaff (page 111), DrumVoice (page 120), Dynamics (page 129), FretBoards (page 136), GrandStaff (page 138), GregorianTranscriptionStaff (page 143), GregorianTranscriptionVoice (page 156), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), KievanVoice (page 206), MensuralStaff (page 219), MensuralVoice (page 233), PetrucciStaff (page 248), PetrucciVoice (page 262), PianoStaff (page 273), RhythmicStaff (page 275), Score (page 281), Staff (page 305), StaffGroup (page 318), StandaloneRhythmScore (page 320), StandaloneRhythmStaff (page 344), StandaloneRhythmVoice (page 350), TabStaff (page 360), TabVoice (page 372), VaticanaScore (page 386), VaticanaStaff (page 409), VaticanaVoice (page 423), and Voice (page 433).
2.2.101 Page_turn_engraver

Decide where page turns are allowed to go.

Music types accepted: break-event (page 51),

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 51), and label-event (page 53),

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 649), and PaperColumn (page 656).

Paper_column_engraver is part of the following context(s) in \layout: ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

2.2.103 Parenthesis_engraver

Parenthesize objects whose parenthesize property is #t.

This engraver creates the following layout object(s): Parentheses (page 657).

Parenthesis_engraver is part of the following context(s) in \layout: ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).
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 55), and part-combine-event (page 56),

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?

soloIText (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 566).

Part_combine_engraver is part of the following context(s) in \layout: CueVoice
(page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice
(page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice
(page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.105 Percent_repeat_engraver

Make whole measure repeats.

Music types accepted: percent-event (page 56),

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 cor-
responding percent repeat number should be printed when countPercentRepeats
is set.

This engraver creates the following layout object(s): PercentRepeat (page 658), and
PercentRepeatCounter (page 660).

Percent_repeat_engraver is part of the following context(s) in \layout: ChordGrid
(page 70), CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice
(page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262),
StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and
Voice (page 433).

2.2.106 Phrasing_slur_engraver

Print phrasing slurs. Similar to Section 2.2.126 [Slur_engraver], page 491.

Music types accepted: note-event (page 55), and phrasing-slur-event (page 56),

This engraver creates the following layout object(s): PhrasingSlur (page 661).
Phrasing_slur_engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 683), SustainPedalLineSpanner (page 701), and UnaCordaPedalLineSpanner (page 730).

Piano_pedal_align_engraver is part of the following context(s) in \layout: DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

2.2.108 Piano_pedal_engraver

Engrave piano pedal symbols and brackets.

- Music types accepted: sostenuto-event (page 58), sustain-event (page 59), and una-corda-event (page 60).

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 663), SostenutoPedal (page 682), SustainPedal (page 700), and UnaCordaPedal (page 728).

Piano_pedal_engraver is part of the following context(s) in \layout: Dynamics (page 129), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).
2.2.109 **Piano_pedal_performer**

Music types accepted: sostenuto-event (page 58), sustain-event (page 59), and una-corda-event (page 60).

   Piano_pedal_performer is part of the following context(s) in \midi: ChordNames (page 98), CueVoice (page 100), DrumVoice (page 120), Dynamics (page 129), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 245), RhythmicStaff (page 275), and StandaloneRhythmStaff (page 344).

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 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), and TrillPitchParentheses (page 723).

   Pitched_trill_engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), VaticanaVoice (page 423), and Voice (page 433).

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: ChordNames (page 98), DrumStaff (page 111), GregorianTranscriptionLyrics (page 140), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), Lyrics (page 216), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), VaticanaLyrics (page 383), and VaticanaStaff (page 409).

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 61), and volta-repeat-start-event (page 61).

   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 return-count  
   End a repeated section. return-count is the number of times to go back from 
   this point to the beginning of the section.

start-repeat repeat-count  
   Start a repeated section. repeat-count is the number of times to perform this 
   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 75), Score (page 281), StandaloneRhythmScore (page 320), and 
VaticanaScore (page 386).

2.2.114 Repeat_tie_engraver  
Create repeat ties.  
   Music types accepted: repeat-tie-event (page 56),
   This engraver creates the following layout object(s): RepeatTie (page 667), and 
   RepeatTieColumn (page 668).

Repeat_tie_engraver is part of the following context(s) in \layout: CueVoice (page 100), 
DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), 
MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), 
TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 670).

Rest_collision_engraver is part of the following context(s) in \layout: DrumStaff 
(page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), 
InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), 
PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff 
(page 409).

2.2.116 Rest_engraver  
Engrave rests.  
   Music types accepted: rest-event (page 57),
   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 669).

Rest_engraver is part of the following context(s) in \layout: CueVoice (page 100), 
DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206),
MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 651).

Rhythmic_column_engraver is part of the following context(s) in layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 672).

Script_column_engraver is part of the following context(s) in layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.119 Script_engraver

Handle note scripted articulations.

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

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 670).

Script_engraver is part of the following context(s) in layout: CueVoice (page 100), DrumVoice (page 120), Dynamics (page 129), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.120 Script_row_engraver

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 672).

Script_row_engraver is part of the following context(s) in layout: DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

2.2.121 Separating_line_group_engraver

Generate objects for computing line-group 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 691).

Separating_line_group_engraver is part of the following context(s) in \layout: ChordNames (page 98), DrumStaff (page 111), FiguredBass (page 135), FretBoards (page 136), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievStaff (page 193), MensuralStaff (page 219), NoteNames (page 243), PetrucciStaff (page 248), RhythmicStaff (page 275), Staff (page 305), StandaloneRhythmStaff (page 344), TabStaff (page 360), and VaticanaStaff (page 409).

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 568), and ControlPolygon (page 569).

Show_control_points_engraver is part of the following context(s) in \layout: ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

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 61),

This engraver creates the following layout object(s): SignumRepetitionis (page 676).

Signum_repetitionis_engraver is part of the following context(s) in \layout: InternalMensuralStaff (page 179), MensuralStaff (page 219), and PetrucciStaff (page 248).

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 687).

Skip_typesetting_engraver is part of the following context(s) in \layout: DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

2.2.125 Slash_repeat_engraver
Make beat repeats.

Music types accepted: repeat-slash-event (page 56),

This engraver creates the following layout object(s): DoubleRepeatSlash (page 586), and RepeatSlash (page 666).
2.2.126 Slur_engraver

Build slur grobs from slur events.

Music types accepted: note-event (page 55), and slur-event (page 57),

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 680).

Slur_engraver is part of the following context(s) in \layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.127 Slur_performer

Music types accepted: slur-event (page 57),

Slur_performer is part of the following context(s) in \midi: ChordNames (page 98), CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), NullVoice (page 245), PetrucciVoice (page 262), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.128 Spacing_engraver

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

Music types accepted: spacing-section-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.).

  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 684).

Spacing_engraver is part of the following context(s) in \layout: ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).
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 529).

Span_arpeggio_engraver is part of the following context(s) in \layout: ChoirStaff
(page 68), GrandStaff (page 138), PianoStaff (page 273), and StaffGroup (page 318).

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 685).

Span_bar_engraver is part of the following context(s) in \layout: GrandStaff (page 138),
PianoStaff (page 273), and StaffGroup (page 318).

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 686).

Span_bar_stub_engraver is part of the following context(s) in \layout: ChoirStaff
(page 68), GrandStaff (page 138), PianoStaff (page 273), and StaffGroup (page 318).

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 693).

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 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156),
KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262),
StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and
Voice (page 433).

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 75), Score (page 281), StandaloneRhythmScore (page 320), and
VaticanaScore (page 386).

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 75), DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), Score (page 281), Staff (page 305), StandaloneRhythmScore (page 320), TabStaff (page 360), VaticanaScore (page 386), and VaticanaStaff (page 409).

### 2.2.136 Staff_highlight_engraver

Highlights music passages.

Music types accepted: staff-highlight-event (page 58),

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 690).

Staff_highlight_engraver is part of the following context(s) in \layout: DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), RhythmicStaff (page 275), Staff (page 305), StandaloneRhythmStaff (page 344), TabStaff (page 360), and VaticanaStaff (page 409).

### 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 70), ChordNames (page 98), DrumStaff (page 111), GregorianTranscriptionLyrics (page 140), GregorianTranscriptionStaff (page 143), KievanStaff (page 193), Lyrics (page 216), MensuralStaff (page 219), NoteNames (page 243), PetrucciStaff (page 248), RhythmicStaff (page 275), Staff (page 305), TabStaff (page 360), and VaticanaStaff (page 409).

### 2.2.138 Staff_symbol_engraver

Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): StaffSymbol (page 691).

Staff_symbol_engraver is part of the following context(s) in \layout: ChordGrid (page 70), DrumStaff (page 111), GregorianTranscriptionStaff (page 143), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), KievanStaff (page 193), MensuralStaff (page 219), PetrucciStaff (page 248), RhythmicStaff
(page 275), Staff (page 305), StandaloneRhythmStaff (page 344), TabStaff (page 360), and VaticanaStaff (page 409).

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 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

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 692).

Stanza_number_engraver is part of the following context(s) in `\layout`:
GregorianTranscriptionLyrics (page 140), Lyrics (page 216), and VaticanaLyrics (page 383).

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 60),

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 599), Stem (page 693), StemStub (page 695), and StemTremolo (page 696).

Stem_engraver is part of the following context(s) in `\layout`:
CueVoice (page 100), DrumVoice (page 120), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), and Voice (page 433).

2.2.142 **System_start_delimiter_engraver**

Create a system start delimiter (i.e., a SystemStartBar, 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 SystemStartBracket, 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 704), SystemStartBrace (page 705), SystemStartBracket (page 706), and SystemStartSquare (page 707).

System_start_delimiter_engraver is part of the following context(s) in \layout: ChoirStaff (page 68), ChordGrid (page 70), GrandStaff (page 138), PianoStaff (page 273), Score (page 281), StaffGroup (page 318), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

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 53), note-event (page 55), and string-number-event (page 59),

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 707).
Tab_note_heads_engraver is part of the following context(s) in \layout: TabVoice (page 372).

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 691).
Tab_staff_symbol_engraver is part of the following context(s) in \layout: TabStaff (page 360).

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 372).

2.2.146 Tempo_performer
Properties (read)

tempoWholesPerMinute (positive moment with no grace part)
The tempo in whole notes per minute.

Tempo_performer is part of the following context(s) in \midi: ChordGridScore (page 75), and Score (page 281).

2.2.147 Text_engraver
Create text scripts.
Music types accepted: text-script-event (page 60),
This engraver creates the following layout object(s): TextScript (page 712).
Text_engraver is part of the following context(s) in \layout: CueVoice (page 100),
DrumVoice (page 120), Dynamics (page 129), GregorianTranscriptionVoice (page 156),
KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262),
StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.148 Text_mark_engraver
Engraves arbitrary textual marks.
Music types accepted: text-mark-event (page 59),
Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): TextMark (page 710).
Text_mark_engraver is part of the following context(s) in \layout: ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).
2.2.149 **Text_spanner_ engraver**

Create text spanner from an event.

Music types accepted: `text-span-event` (page 60),
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 714).

**Text_spanner_ engraver** is part of the following context(s) in `layout`: `CueVoice` (page 100), `DrumVoice` (page 120), `Dynamics` (page 129), `GregorianTranscriptionVoice` (page 156), `KievanVoice` (page 206), `MensuralVoice` (page 233), `PetrucciVoice` (page 262), `StandaloneRhythmVoice` (page 350), `TabVoice` (page 372), and `Voice` (page 433).

2.2.150 **Tie_ engraver**

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 60),
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 715), and `TieColumn` (page 717).

**Tie_ engraver** is part of the following context(s) in `layout`: `CueVoice` (page 100), `DrumVoice` (page 120), `GregorianTranscriptionVoice` (page 156), `KievanVoice` (page 206), `MensuralVoice` (page 233), `NoteNames` (page 243), `NullVoice` (page 245), `PetrucciVoice` (page 262), `StandaloneRhythmVoice` (page 350), `TabVoice` (page 372), `VaticanaVoice` (page 423), and `Voice` (page 433).

2.2.151 **Tie_performer**

Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 60),
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 98), `CueVoice` (page 100), `DrumVoice` (page 120), `GregorianTranscriptionVoice` (page 156), `KievanVoice` (page 206), `MensuralVoice` (page 233), `NullVoice` (page 245), `PetrucciVoice` (page 262), `TabVoice` (page 372), `VaticanaVoice` (page 423), and `Voice` (page 433).
2.2.152 **Time_signature_ engraver**

Create a Section 3.1.147 [TimeSignature], page 718, whenever timeSignatureFraction changes.

Music types accepted: time-signature-event (page 60),

Properties (read)

  initialTimeSignatureVisibility (vector)
  break visibility for the initial time signature.

  partialBusy (boolean)
  Signal that \partial acts at the current timestep.

  timeSignatureFraction (positive, finite 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 718).

Time_signature_ engraver is part of the following context(s) in \layout: DrumStaff (page 111), InternalGregorianStaff (page 166), InternalMensuralStaff (page 179), MensuralStaff (page 219), PetrucciStaff (page 248), RhythmicStaff (page 275), Staff (page 305), and TabStaff (page 360).

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 60),

Properties (read)

  timeSignatureFraction (positive, finite 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 75), and Score (page 281).

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 50), bar-check-event (page 50), bar-event (page 50), fine-event (page 52), and partial-event (page 56),

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 (positive moment with no grace part)
  Smallest unit of time that will stand on its own as a subdivided section.

  currentBarNumber (integer)
  Contains the current bar number. This property is incremented at every bar line.
internalBarNumber (integer)
Contains the current bar number. This property is used for internal timekeeping, among others by the Accidental_engraver.

measureLength (positive moment with no grace part)
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 (positive, finite 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 (positive moment with no grace part)
Smallest unit of time that will stand on its own as a subdivided section.

currentBarNumber (integer)
Contains the current bar number. This property is incremented at every bar line.

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

measureLength (positive moment with no grace part)
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 (positive, finite 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 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386); in \midi: ChordGridScore (page 75), and Score (page 281).

2.2.155 Trill_spanner_engraver

Create trill spanners.

Music types accepted: trill-span-event (page 60),

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.).
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This engraver creates the following layout object(s): TrillSpanner (page 724).

Trill_spanner_engraver is part of the following context(s) in layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

2.2.156 Tuplet_engraver

Catch tuplet events and generate appropriate bracket.

Music types accepted: tuplet-span-event (page 60),

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 725), and TupletNumber (page 727).

Tuplet_engraver is part of the following context(s) in layout: CueVoice (page 100), DrumVoice (page 120), GregorianTranscriptionVoice (page 156), KievanVoice (page 206), MensuralVoice (page 233), PetrucciVoice (page 262), StandaloneRhythmVoice (page 350), TabVoice (page 372), VaticanaVoice (page 423), and Voice (page 433).

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 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

2.2.158 Vaticana_ligature_engraver

Handle ligatures by glueing special ligature heads together.

Music types accepted: ligature-event (page 54), and pes-or-flexa-event (page 56),

This engraver creates the following layout object(s): DotColumn (page 581), and VaticanaLigature (page 731).

Vaticana_ligature_engraver is part of the following context(s) in layout: VaticanaVoice (page 423).

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 689), and VerticalAlignment (page 732).
2.2.160 Volta_engraver

Make volta brackets.

Music types accepted: dal-segno-event (page 52), fine-event (page 52), and volta-span-event (page 61).

Properties (read)

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>currentCommandColumn</td>
<td>Grob that is X-parent to all current breakable items (clef, key signature, etc.).</td>
</tr>
<tr>
<td>printTrivialVoltaRepeats</td>
<td>Notate volta-style repeats even when the repeat count is 1.</td>
</tr>
<tr>
<td>repeatCommands</td>
<td>A list of commands related to volta-style repeats.</td>
</tr>
<tr>
<td>return-count</td>
<td>End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.</td>
</tr>
<tr>
<td>repeat-count</td>
<td>Start a repeated section. repeat-count is the number of times to perform this section.</td>
</tr>
<tr>
<td>volta</td>
<td>If text is markup, start a volta bracket with that label; if text is #f, end a volta bracket.</td>
</tr>
<tr>
<td>stavesFound</td>
<td>A list of all staff-symbols found.</td>
</tr>
<tr>
<td>voltaSpannerDuration</td>
<td>The maximum musical length of a VoltaBracket when its musical-length property is not set.</td>
</tr>
</tbody>
</table>

This engraver creates the following layout object(s): VoltaBracket (page 735), and VoltaBracketSpanner (page 736).

Volta_engraver is part of the following context(s) in \layout: ChordGridScore (page 75), Score (page 281), StandaloneRhythmScore (page 320), and VaticanaScore (page 386).

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)
  A list 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 voltes.

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 #t then beams are generated automatically. If set to #f, auto-beaming is switched off as soon as the current beam (if any) is finished according to the auto-beaming rules.

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 (positive moment with no grace part)
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 to a clef. Values of 7 and -7 are common.

clefTranspositionFormatter (procedure)
    A procedure that takes the transposition number of a Clef grob as a string and the style
    as a symbol and returns a markup.

clefTranspositionStyle (symbol)
    Determines the way the ClefModifier grob of a clef 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 (positive moment with no grace part)
    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 to a cue clef. Values of 7 and -7 are common.

cueClefTranspositionFormatter (procedure)
    A procedure that takes the transposition number of a cueClef grob as a string and the
    style as a symbol and returns a markup.

cueClefTranspositionStyle (symbol)
    Determines the way the ClefModifier grob of a cue clef is displayed. Possible values are
    'default, 'parenthesized, and 'bracketed.

currentBarNumber (integer)
    Contains the current bar number. 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 ‘::|..|::’.

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:
   ‘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 #t, 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 (positive moment with no grace part)
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 bar number. This property is used for internal timekeeping, among
  others by the Accidental_engraver.

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

keyAlterationOrder (list)
  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?

maximumBeamSubdivisionInterval (non-negative moment with no grace part)
   Maximum interval to subdivide beams, limiting the depth of beamlets removed from subdi-
   vision. Ranges from 0 to infinity ( 0=no subdivision, +inf.0=no limit).

maximumFretStretch (number)
   Don't allocate frets further than this from specified frets.

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

measureLength (positive moment with no grace part)
   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 incom-
   plete 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).

minimumBeamSubdivisionInterval (non-negative moment with no grace part)
Minimum interval to subdivide beams, ignoring beamlets whose subdivision depth is too shallow. Ranges from 0 to infinity (0=no limit, +inf.0=no subdivision).

minimumFret (number)
The tablature auto string-selecting mechanism selects the highest string with a fret at least minimumFret.

minimumPageTurnLength (moment)
Minimum length of a rest for a page turn to be allowed.

minimumRepeatLengthForPageTurn (moment)
Minimum length of a repeated section for a page turn to be allowed within that section.

minorChordModifier (markup)
Markup displayed following the root for a minor chord

noChordSymbol (markup)
Markup to be displayed for rests in a ChordNames context.

noteNameFunction (procedure)
Function used to convert pitches into strings and markups.

noteNameSeparator (string)
String used to separate simultaneous NoteName objects.

noteToFretFunction (procedure)
Convert list of notes and list of defined strings to full list of strings and fret numbers. Parameters: The context, a list of note events, a list of tabstring events, and the fretboard grob if a fretboard is desired.
nullAccidentals (boolean)
The Accidental_engraver generates no accidentals for notes in contexts were this is set.
In addition to 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.

printInitialRepeatBar (boolean)
Use a special bar line at the start of a volta repeat even at the beginning of the piece.

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?
printTrivialVoltaRepeats (boolean)
Notate volta-style repeats even when the repeat count is 1.

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 return-count
End a repeated section. return-count is the number of times to go back from this point to the beginning of the section.

start-repeat repeat-count
Start a repeated section. repeat-count is the number of times to perform this 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.

respectIncompleteBeams (boolean)
When subdividing beams, limit the beam subdivision interval until it is less than or equal to the remaining length from the current moment. Note that it is somewhat unclear whether to treat incomplete beams specially or not in beam subdivision is the correct way of valid notation. The default value of false is said to be the correct option, although beam subdivision as if this property is true is not unpopular.

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 #t, 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, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent
on maxSubdivideInterval, between beats at multiples of minSubdivideInterval.

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\1/2’

suspendMelodyDecisions (boolean)
   When using the Melody_engraver, stop changing orientation of stems based on the melody
when this is set to #t.

suspendRestMerging (boolean)
   When using the Merge_rest_engraver do not merge rests when this is set to #t.

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 argu-
ments: the context and the string.

tempoHideNote (boolean)
   Hide the note = count in tempo marks.
tempoWholesPerMinute (positive moment with no grace part)
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 (positive, finite 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 (non-negative moment with no grace part)
Normally, a tuplet bracket is as wide as the \times expression that gave rise to it. This property can shorten the bracket.

\{
  \set tupletSpannerDuration = \musicLength 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 (non-negative moment with no grace part)
The maximum musical length of a VoltaBracket when its musical-length property is not set.
This property is deprecated; overriding the musical-length property of VoltaBracket is recommended.
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.

**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.

**currentTupletDescription (ly:tuplet-description)**

An object describing the current tuplet description, or `$()$`. Tuplet description objects are opaque to Scheme.

**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.

propertyStack (association list (list of pairs))
   An alist used by \pushContextProperty and \popContextProperty to emulate a context
   property stack.

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 522), grob.

Accidental objects are created by the following engraver(s): Accidental_engraver (page 443).

Standard settings:

\begin{itemize}
\item after-line-breaking (boolean):
  \begin{itemize}
  \item ly:accidental-interface::remove-tied
  \end{itemize}
  Dummy property, used to trigger callback for after-line-breaking.
\item alteration (number):
  \begin{itemize}
  \item accidental-interface::calc-alteration
  \end{itemize}
  Alteration numbers for accidental.
\item avoid-slur (symbol):
  \begin{itemize}
  \item 'inside
  \end{itemize}
  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.
\item extra-spacing-width (pair of numbers):
  \begin{itemize}
  \item '(~0.2 . 0.0)
  \end{itemize}
  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).
\item glyph-name (string):
  \begin{itemize}
  \item accidental-interface::calc-glyph-name
  \end{itemize}
  The glyph name within the font. In the context of (span) bar lines or clefs, glyph-name represents a processed form of glyph, where decisions about line breaking, etc., are already taken.
\item horizontal-skylines (pair of skylines):
  \begin{itemize}
  \item #<unpure-pure-container #<procedure ly:accidental-interface::horizontal-skylines (_)> >
  \end{itemize}
  Two skylines, one to the left and one to the right of this grob.
\item stencil (stencil):
  \begin{itemize}
  \item ly:accidental-interface::print
  \end{itemize}
  The symbol to print.
\item vertical-skylines (pair of skylines):
  \begin{itemize}
  \item #<unpure-pure-container #<procedure ly:grob::vertical-skylines-from-stencil (_)> #<procedure ly:grob::pure-simple-vertical-skylines-from-extents (_ _)> >
  \end{itemize}
\end{itemize}
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.

Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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 739), accidental-switch-interface (page 741), font-interface (page 764), grob-interface (page 770), inline-accidental-interface (page 777), and item-interface (page 779).

This object is of class Item (characterized by item-interface (page 779)).

3.1.2 AccidentalCautionary

A cautionary accidental, normally enclosed in parentheses.

AccidentalCautionary objects are created by the following engraver(s):

Accidental_engraver (page 443).

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 or clefs, 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.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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 739), accidental-switch-interface (page 741), font-interface (page 764), grob-interface (page 770), inline-accidental-interface (page 777), and item-interface (page 779).

This object is of class Item (characterized by item-interface (page 779)).

3.1.3 AccidentalPlacement

In groups of Accidental (page 520), 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 the following engraver(s): Accidental_engraver (page 443), and Ambitus_engraver (page 445).

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 740), grob-interface (page 770), and item-interface (page 779).

This object is of class Item (characterized by item-interface (page 779)).

3.1.4 AccidentalSuggestion
An annotational accidental as used in musica ficta. Normally positioned above a note.

AccidentalSuggestion objects are created by the following engraver(s):
Accidental_engraver (page 443).

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 or clefs, 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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.
  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).
This object supports the following interface(s): accidental-interface (page 739), accidental-suggestion-interface (page 740), accidental-switch-interface (page 741), font-interface (page 764), grob-interface (page 770), item-interface (page 779), outside-staff-interface (page 797), script-interface (page 802), self-alignment-interface (page 803), and side-position-interface (page 806).

This object is of class Item (characterized by item-interface (page 779)).

3.1.5 Ambitus

An ambitus, giving the range of pitches of a voice or instrument. It aligns AmbitusAccidental (page 527), AmbitusLine (page 527), and AmbitusNoteHead (page 528), horizontally and defines the horizontal spacing from the ambitus to other items.

Ambitus objects are created by the following engraver(s): Ambitus_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.

break-align-symbol (symbol):

'ambitus
This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

break-visibility (vector):

#(#f #f #t)
A vector of 3 booleans, #(end-of-line unbroken begin-of-line). #t means visible, #f means killed.

non-musical (boolean):

#t
True if the grob belongs to a NonMusicalPaperColumn.

space-alist (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)

If space-alist is defined for a grob that gets spaced in a staff, an entry for first-note must be present. If there is no next-note entry, the value of first-note is used instead.

Choices for spacing-style are:

extra-space
Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.

shrink-space
Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.

semi-shrink-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 shrinkable.

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 741), axis-group-interface (page 743), break-aligned-interface (page 752), grob-interface (page 770), and item-interface (page 779).

This object is of class Item (characterized by item-interface (page 779)).

3.1.6 AmbitusAccidental
An accidental in an Ambitus (page 525).

AmbitusAccidental objects are created by the following engraver(s): Ambitus_engraver (page 445).

Standard settings:

- glyph-name (string):
  accidental-interface::calc-glyph-name
  The glyph name within the font.
  In the context of (span) bar lines or clefs, 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.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

- 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 739), accidental-switch-interface (page 741), break-aligned-interface (page 752), font-interface (page 764), grob-interface (page 770), and item-interface (page 779).

This object is of class Item (characterized by item-interface (page 779)).

3.1.7 AmbitusLine
The vertical line in an Ambitus (page 525).

AmbitusLine objects are created by the following engraver(s): Ambitus_engraver (page 445).

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.
    Note that many objects have special positioning considerations, which cause any
    setting of X-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).

This object supports the following interface(s): ambitus-interface (page 741),
font-interface (page 764), grob-interface (page 770), and item-interface (page 779).
This object is of class Item (characterized by item-interface (page 779)).

3.1.8 AmbitusNoteHead
A note head in an Ambitus (page 525).
AmbitusNoteHead objects are created by the following engraver(s): Ambitus_engraver
(page 445).

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 or clefs, 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):

\[
\text{Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.}
\]

Y-offset (number):

\[
\text{The vertical amount that this object is moved relative to its Y-parent.}
\]

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): ambitus-interface (page 741), font-interface (page 764), grob-interface (page 770), item-interface (page 779), ledgered-interface (page 783), note-head-interface (page 794), and staff-symbol-referencer-interface (page 817).

This object is of class Item (characterized by item-interface (page 779)).

### 3.1.9 Arpeggio

An arpeggio line (normally a vertical wiggle).

Arpeggio objects are created by the following engraver(s): Arpeggio_engraver (page 446), and Span_arpeggio_engraver (page 492).

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.
    For ties, there is a distinction between exact and inexact values: an exact value serves
    as a rough vertical offset that gets further tuned to make the tie avoid staff lines. An
    inexact value is taken as the precise vertical offset without further adjustments.

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.
    Note that many objects have special positioning considerations, which cause any
    setting of X-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).

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.
    Note that many objects have special positioning considerations, which cause any
    setting of Y-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).
This object supports the following interface(s): arpeggio-interface (page 742),
font-interface (page 764), grob-interface (page 770), item-interface (page 779),
side-position-interface (page 806), and staff-symbol-referencer-interface
(page 817).

This object is of class Item (characterized by item-interface (page 779)).

3.1.10 BalloonText

A balloon text with a pointing line to visually mark and annotate another grob.

BalloonText objects are created by the following engraver(s): Balloon_engraver
(page 447).

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 at lily/output-lib.scm:3119:0 (grob)>
  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 at lily/output-lib.scm:1485:0 (grob)>
  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 at lily/output-lib.scm:1485:0 (grob)>
The horizontal amount that this object is moved relative to its X-parent.
Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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 at lily/output-lib.scm:1485:0 (grob)>
The vertical amount that this object is moved relative to its Y-parent.
Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): accidental-switch-interface (page 741), balloon-interface (page 745), font-interface (page 764), grob-interface (page 770), sticky-grob-interface (page 820), and text-interface (page 824).

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 779), and spanner-interface (page 814).

3.1.11 BarLine

A bar line.

BarLine objects are created by the following engraver(s): Bar_engraver (page 447).

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 at lily/output-lib.scm:1540:0 (grob)>
   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 or clefs, 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.

right-justified (boolean):
  #f
  Used for BarLines to right-align them. Usually the extent of a BarLine has some
  positive value to the right. If this property is set to #t, BarLine.stencil is translated
  to the left by this value. Needs to be set at Score or StaffGroup level. As a result
  all BarLines of said Score or StaffGroup are right-justified.

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).

short-bar-extent (pair of numbers):
  ly:bar-line::calc-short-bar-extent
  The Y-extent of a short bar line. The default is half the normal bar extent, rounded
  up to an integer number of staff spaces.

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 semi-shrink-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)

If space-alist is defined for a grob that gets spaced in a staff, an entry for first-note must be present. If there is no next-note entry, the value of first-note is used instead.

Choices for spacing-style are:

- **extra-space**
  Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.

- **shrink-space**
  Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.

- **semi-shrink-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 shrinkable.

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 745), break-aligned-interface (page 752), font-interface (page 764), grob-interface (page 770), item-interface (page 779), and pure-from-neighbor-interface (page 800).

This object is of class Item (characterized by item-interface (page 779)).

3.1.12 BarNumber
An ordinary bar number. Centered bar numbers are managed separately with CenteredBarNumber (page 554), grobs.

BarNumber objects are created by the following engraver(s): Bar_number_engraver (page 450).

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-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 at lily/output-lib.scm:363:2 (grob)>
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. If not a number, align on the object’s reference point.

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. Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): bar-number-interface (page 747), break-alignable-interface (page 752), font-interface (page 764), grob-interface (page 770), item-interface (page 779), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.13 BassFigure

A number in figured bass. It can contain an alteration as well.

BassFigure objects are created by the following engraver(s): Figured_bass_engraver (page 465).

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 741), bass-figure-interface (page 747), font-interface (page 764), grob-interface (page 770), item-interface (page 779), rhythmic-grob-interface (page 801), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.14 BassFigureAlignment

An auxiliary grob to stack several BassFigureLine (page 541), grobs vertically.

BassFigureAlignment objects are created by the following engraver(s): Figured_bass_engraver (page 465).

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.
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3.1.15 BassFigureAlignmentPositioning

If figured bass is used in the Staff (page 305), 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 the following engraver(s): Figured_bass_position_engraver (page 466).

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.

outside-staff-priority (number):
   25
   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.

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):
   ly:axis-group-interface::height
   Extent (size) in the Y direction, measured in staff-space units, relative to object’s
   reference point.

Y-offset (number):
   ly:side-position-interface::y-aligned-side
   The vertical amount that this object is moved relative to its Y-parent.
   Note that many objects have special positioning considerations, which cause any
   setting of Y-offset to be ignored or modified, even though the object supports the
   self-alignment-interface (page 803).

   This object supports the following interface(s): axis-group-interface
   (page 743), grob-interface (page 770), outside-staff-interface (page 797),
   side-position-interface (page 806), and spanner-interface (page 814).

   This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.16 BassFigureBracket

Brackets around a figured bass (or elements of it).
BassFigureBracket objects are created by the following engraver(s):
Figured_bass_engraver (page 465).

   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 761), grob-interface (page 770), and item-interface (page 779).
   This object is of class Item (characterized by item-interface (page 779)).

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 the following engraver(s):
   Figured_bass_engraver (page 465).

   Standard settings:
   bound-details (alist, with symbols as keys):
   '((right (attach-dir . 1) (padding . -0.15))
   (right-broken (attach-dir . -1) (padding . 0.5))
   (left-broken (attach-dir . 1) (padding . 0.5))
   (left (attach-dir . 1) (padding . 0.15)))
   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.

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.

stencil (stencil):
   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.
   Note that many objects have special positioning considerations, which cause any
   setting of Y-offset to be ignored or modified, even though the object supports the
   self-alignment-interface (page 803).

   This object supports the following interface(s): figured-bass-continuation-interface
   (page 762), grob-interface (page 770), horizontal-line-spanner-interface (page 776),
   and spanner-interface (page 814).

   This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.18 BassFigureLine

An auxiliary grob providing a baseline for bass figures that should be aligned vertically.

BassFigureLine objects are created by the following engraver(s):
   Figured_bass_engraver (page 465).
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::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): axis-group-interface (page 743), grob-interface (page 770), outside-staff-axis-group-interface (page 796), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.19 Beam

A beam.

Beam objects are created by the following engraver(s): Auto_beam_engraver (page 446), Beam_engraver (page 451), Chord_tremolo_engraver (page 456), Grace_auto_beam_engraver (page 468), and Grace_beam_engraver (page 469).
Standard settings:

accidental-padding (number):

1.0

Property used by Beam to avoid accidentals in whole note tremolos.

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):

'((beam-eps . 0.001)
 (collision-padding . 0.35)
 (collision-penalty . 500)
 (damping-direction-penalty . 800)
 (hint-direction-penalty . 20)
 (ideal-slope-factor . 10)
 (musical-direction-factor . 400)
 (region-size . 2)
(round-to-zero-slope . 0.02)
(secondary-beam-demerit . 10)
(stem-collision-factor . 0.1)
(stem-length-demerit-factor . 5)
(stem-length-limit-penalty . 5000))

An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

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-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.

gap (dimension, in staff space):
  0.8
  Size of a gap in a variable symbol.

knee (boolean):
  ly:beam::calc-knee
  Is this beam kneed?

minimum-length (dimension, in staff space):
  6.0
  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.

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.
springs-and-rods (boolean):
    ly:beam::tremolo-springs-and-rods
    Dummy variable for triggering spacing routines.

stencil (stencil):
    ly:beam::print
    The symbol to print.

transparent (boolean):
    #<procedure at lily/output-lib.scm:1529:0 (grob)>
    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 747), grob-interface (page 770), spanner-interface (page 814), staff-symbol-referencer-interface (page 817), and unbreakable-spanner-interface (page 832).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.20 BendAfter

A grob for displaying falls and doits.

BendAfter objects are created by the following engraver(s): Bend_engraver (page 453).

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 750), grob-interface (page 770), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).
3.1.21 BendSpanner

A string bending as used in tablature notation.

BendSpanner objects are created by the following engraver(s): Bend_spanner_engraver (page 453).

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 (thickness x-y-coords height width dir)>)
  (bend-amount-strings
    (quarter . "1/4")
    (half . "1/2")
    (three-quarter . "3/4")
    (full . #f))
  (bend-arrowhead-height . 1.25)
  (bend-arrowhead-width . 0.8)
  (curvature-factor . 0.35)
  (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))

An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

direction (direction):
  1
If \texttt{side-axis} is 0 (or \texttt{X}), then this property determines whether the object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object. Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP=1}, \texttt{DOWN=-1}, \texttt{LEFT=-1}, \texttt{RIGHT=1}, \texttt{CENTER=0}.

\textbf{font-shape (symbol):}

\texttt{italic}

Select the shape of a font. Possible values are \texttt{upright}, \texttt{italic}, \texttt{oblique}, and \texttt{slanted} (which is the same as \texttt{oblique}).

\textbf{font-size (number):}

\texttt{-2}

The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, \texttt{-1} is smaller, \texttt{+1} is bigger. Each step of 1 is approximately 12\% larger; 6 steps are exactly a factor 2 larger. If the context property \texttt{fontSize} is set, its value is added to this before the glyph is printed. Fractional values are allowed.

\textbf{padding (dimension, in staff space):}

\texttt{0.15}

Add this much extra space between objects that are next to each other.

\textbf{side-axis (number):}

\texttt{1}

If the value is \texttt{X} (or equivalently \texttt{0}), the object is placed horizontally next to the other object. If the value is \texttt{Y} or \texttt{1}, it is placed vertically.

\textbf{spanner-id (index or symbol):}

\texttt{"
}

An identifier to distinguish concurrent spanners.

\textbf{stencil (stencil):}

\texttt{bend-spanner::print}

The symbol to print.

\textbf{style (symbol):}

\texttt{()'\)

This setting determines in what style a grob is typeset. Valid choices depend on the \texttt{stencil} callback reading this property.

\textbf{text (markup):}

\texttt{#f}

Text markup. See Section “Formatting text” in \textit{Notation Reference}.

\textbf{thickness (number):}

\texttt{1}

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

\textbf{vertical-skylines (pair of skylines):}

\texttt{#<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.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): bend-interface (page 750),
font-interface (page 764), grob-interface (page 770), line-spanner-interface
(page 784), outside-staff-interface (page 797), spanner-interface (page 814),
text-interface (page 824), and text-script-interface (page 825).

This object is of class Spanner (characterized by spanner-interface (page 814)).

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 549).

BreakAlignGroup objects are created by the following engraver(s):
Break_align_engraver (page 454).

Standard settings:

  axes (list):
  '()  
  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 align-
  ing 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 743),
break-aligned-interface (page 752), grob-interface (page 770), and item-interface
(page 779).

This object is of class Item (characterized by item-interface (page 779)).
3.1.23 **BreakAlignment**

An auxiliary grob that manages the horizontal ordering of BreakAlignGroup (page 548), grobs within a NonMusicalPaperColumn (page 649), grob (for example, whether the time signature follows or precedes a bar line).

**BreakAlignment** objects are created by the following engraver(s): Break_align_engraver (page 454).

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
    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:

\overridescore{BreakAlignment.break-align-orders =
  #(\makevector 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 743), break-alignment-interface (page 754), grob-interface (page 770), and item-interface (page 779).

This object is of class Item (characterized by item-interface (page 779)).

### 3.1.24 BreathingSign

A breathing sign.

BreathingSign objects are created by the following engraver(s): Breathing_sign_engraver (page 454), and Caesura_engraver (page 454).

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)

If space-alist is defined for a grob that gets spaced in a staff, an entry for first-note must be present. If there is no next-note entry, the value of first-note is used instead.

Choices for spacing-style are:

   extra-space
     Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.

shrink-space
Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.

semi-shrink-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 shrinkable.

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.

  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

  This object supports the following interface(s): break-aligned-interface (page 752), breathing-sign-interface (page 755), font-interface (page 764), grob-interface (page 770), item-interface (page 779), outside-staff-interface (page 797), and text-interface (page 824).

  This object is of class Item (characterized by item-interface (page 779)).
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 the following engraver(s): Caesura_engraver (page 454).

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. If not a number, align on the object’s reference point.

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.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.
  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): caesura-script-interface (page 755), font-interface (page 764), grob-interface (page 770), item-interface (page 779), outside-staff-interface (page 797), script-interface (page 802), self-alignment-interface (page 803), and side-position-interface (page 806).

This object is of class Item (characterized by item-interface (page 779)).

### 3.1.26 CenteredBarNumber
A centered bar number; see also CenteredBarNumberLineSpanner (page 555). Ordinary bar numbers are managed with BarNumber (page 536), grobs.

CenteredBarNumber objects are created by the following engraver(s):
Bar_number_engraver (page 450).

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-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. If not a number, align on the object’s reference point.

**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.

Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): bar-number-interface (page 747), centered-bar-number-interface (page 755), centered-spanner-interface (page 755), font-interface (page 764), grob-interface (page 770), spanner-interface (page 814), and text-interface (page 824).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.27 CenteredBarNumberLineSpanner

An auxiliary grob providing a vertical baseline to align CenteredBarNumber (page 554), grobs.

CenteredBarNumberLineSpanner objects are created by the following engraver(s):
Centered_bar_number_align_engraver (page 455).

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.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): axis-group-interface (page 743),
bar-number-interface (page 747), centered-bar-number-line-spanner-interface
(page 755), grob-interface (page 770), outside-staff-interface (page 797),
side-position-interface (page 806), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.28 ChordName
A stand-alone chord name. For chord names in chord grids, see GridChordName (page 605).

ChordName objects are created by the following engraver(s): Chord_name_engraver
(page 455).

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 \((-\text{inf.} . 0\) \(+\text{inf.} . 0\).

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 \((+\text{inf.} . \ -\text{inf.} . 0)\).

font-family (symbol):
'sans'
The font family is the broadest category for selecting text fonts. Options include serif, sans and typewriter.

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):

This object supports the following interface(s): accidental-switch-interface (page 741), chord-name-interface (page 756), font-interface (page 764), grob-interface (page 770), item-interface (page 779), outside-staff-interface (page 797), rhythmic-grob-interface (page 801), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

### 3.1.29 ChordSquare

In a chord grid, this grob represents one chord square. It helps place GridChordName (page 605), 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 691), and BarLine (page 532).

ChordSquare objects are created by the following engraver(s): Chord_square_ engraver (page 456).

Standard settings:

measure-division-chord-placement-alist (association list (list of pairs)):
\('(((1) (0 . 0)\))\)
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 (grob)>>
  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 756), grob-interface (page 770), line-interface (page 783), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.30 Clef

A clef. See also ClefModifier (page 561), CueClef (page 571), and CueEndClef (page 574).
Clef objects are created by the following engraver(s): Clef_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.

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 or clefs, 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)
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)

If space-alist is defined for a grob that gets spaced in a staff, an entry for first-note must be present. If there is no next-note entry, the value of first-note is used instead.

Choices for spacing-style are:

- **extra-space**
  Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.
shrink-space
Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.

semi-shrink-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 shrinkable.

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.

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): break-aligned-interface (page 752), clef-interface (page 757), font-interface (page 764), grob-interface (page 770), item-interface (page 779), pure-from-neighbor-interface (page 800), and staff-symbol-referencer-interface (page 817).

This object is of class Item (characterized by item-interface (page 779)).

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 558), CueClef (page 571), and CueEndClef (page 574).

ClefModifier objects are created by the following engraver(s): Clef_engraver (page 456), and Cue_clef_engraver (page 459).

Standard settings:
break-visibility (vector):
#<procedure at lily/output-lib.scm:1529:0 (grob)>
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 at lily/output-lib.scm:1529:0 (grob)>
  The color of this grob.

font-shape (symbol):
  'italic
  Select the shape of a font. Possible values are upright, italic, oblique, and
  slanted (which is the same as oblique).

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 not a number,
  align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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):
  clef-modifier::print
  The symbol to print.

transparent (boolean):
  #<procedure at lily/output-lib.scm:1529:0 (grob)>
  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.
  Note that many objects have special positioning considerations, which cause any
  setting of X-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).
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.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): clef-modifier-interface (page 757),
font-interface (page 764), grob-interface (page 770), item-interface (page 779),
outside-staff-interface (page 797), self-alignment-interface (page 803),
side-position-interface (page 806), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.32 ClusterSpanner
A cluster spanner. The envelope shape within the spanner is given by ClusterSpannerBeacon
(page 564), grobs.

ClusterSpanner objects are created by the following engraver(s):
Cluster_spanner_engraver (page 457).

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 757),
grob-interface (page 770), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).
3.1.33 ClusterSpannerBeacon

An auxiliary grob to specify the minimum and maximum pitch of a ClusterSpanner (page 563), grob at a given moment.

ClusterSpannerBeacon objects are created by the following engraver(s): Cluster_spanner_engraver (page 457).

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 757), grob-interface (page 770), item-interface (page 779), and rhythmic-grob-interface (page 801).

This object is of class Item (characterized by item-interface (page 779)).

3.1.34 CodaMark

A coda mark.

CodaMark objects are created by the following engraver(s): Mark_engraver (page 476).

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 \((+\infty, 0 \ , \ -\infty, 0)\).

**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. If not a number, align on the object’s reference point.

**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.
Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

Y-extent (pair of numbers):

\[
\text{Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.}
\]

Y-offset (number):

\[
\text{The vertical amount that this object is moved relative to its Y-parent.}
\]

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): break-alignable-interface (page 752), coda-mark-interface (page 758), font-interface (page 764), grob-interface (page 770), item-interface (page 779), mark-interface (page 787), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

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 the following engraver(s): Part_combine_engraver (page 485).

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. Common choices are normal and bold. The full list of
symbols that can be used is: thin, ultralight, light, semilight, book, normal,
medium, semibold, bold, ultrabold, heavy, ultraheavy.

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 not a number,
align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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.
Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.
Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): accidental-switch-interface (page 741), font-interface (page 764), grob-interface (page 770), item-interface (page 779), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), text-interface (page 824), and text-script-interface (page 825).

This object is of class Item (characterized by item-interface (page 779)).

3.1.36 ControlPoint
A visual representation of a Bézier control point in ties and slurs.

ControlPoint objects are created by the following engraver(s):
Show_control_points_engraver (page 490).

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 (layout props radius thickness filled)>
      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 at lily/output-lib.scm:3104:0 (grob)>
    The horizontal amount that this object is moved relative to its X-parent.
    Note that many objects have special positioning considerations, which cause any
    setting of X-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).

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 at lily/output-lib.scm:3104:0 (grob)>
    The vertical amount that this object is moved relative to its Y-parent.
    Note that many objects have special positioning considerations, which cause any
    setting of Y-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).

This object supports the following interface(s): control-point-interface (page 758),
  grob-interface (page 770), sticky-grob-interface (page 820), and text-interface
  (page 824).

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 con-
 ditionally depending on the class: item-interface (page 779), and spanner-interface
  (page 814).

3.1.37 ControlPolygon
A visual representation of a Bézier control polygon as used in ties and slurs.

ControlPolygon objects are created by the following engraver(s):
Show_control_points_engraver (page 490).

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 758),
grob-interface (page 770), sticky-grob-interface (page 820), and text-interface
(page 824).
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 779), and spanner-interface (page 814).

3.1.38 CueClef

A clef starting a cue. See also Clef (page 558), ClefModifier (page 561), and CueEndClef (page 574).

CueClef objects are created by the following engraver(s): Cue_clef_engraver (page 459).

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 or clefs, 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)
  If space-alist is defined for a grob that gets spaced in a staff, an entry for first-note must be present. If there is no next-note entry, the value of first-note is used instead.
  Choices for spacing-style are:
    extra-space
      Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.

shrink-space
Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.

semi-shrink-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 shrinkable.

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.

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): break-aligned-interface (page 752), clef-interface (page 757), font-interface (page 764), grob-interface (page 770), item-interface (page 779), pure-from-neighbor-interface (page 800), and staff-symbol-referencer-interface (page 817).

This object is of class Item (characterized by item-interface (page 779)).
3.1.39 CueEndClef
A clef ending a cue. See also Clef (page 558), ClefModifier (page 561), and CueClef (page 571).

CueEndClef objects are created by the following engraver(s): Cue_clef_engraver (page 459).

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 or clefs, 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)

If space-alist is defined for a grob that gets spaced in a staff, an entry for

first-note must be present. If there is no next-note entry, the value of first-note

is used instead.

Choices for spacing-style are:

extra-space

Put this much space between the two grobs. The space is stretchable

and shrinkable when paired with first-note or next-note; other-

wise it is fixed.

minimum-space

Put at least this much space between the left sides of both grobs, with-

out allowing them to collide. The space is stretchable and shrinkable

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 and shrinkable.

shrink-space
Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.

semi-shrink-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 shrinkable.

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.
Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): break-aligned-interface (page 752), clef-interface (page 757), font-interface (page 764), grob-interface (page 770), item-interface (page 779), pure-from-neighbor-interface (page 800), and staff-symbol-referencer-interface (page 817).

This object is of class Item (characterized by item-interface (page 779)).

3.1.40 Custos
A custos, mainly used in older notation like Gregorian chant.

Custos objects are created by the following engraver(s): Custos_engraver (page 460).

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)

  If space-alist is defined for a grob that gets spaced in a staff, an entry for first-note must be present. If there is no next-note entry, the value of first-note is used instead.

  Choices for spacing-style are:

  extra-space
  Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.

shrink-space
Only compatible with first-note and next-note. Put this much
space between the two grobs. The space is only shrinkable.

semi-shrink-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 shrinkable.

Rules for this spacing are much more complicated than this. See [Wanske] page

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.
  Note that many objects have special positioning considerations, which cause any
setting of Y-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).

This object supports the following interface(s): break-aligned-interface (page 752),
custos-interface (page 759), font-interface (page 764), grob-interface (page 770),
item-interface (page 779), and staff-symbol-referencer-interface (page 817).

This object is of class Item (characterized by item-interface (page 779)).

3.1.41 Divisio
A structural divider in a chant, often calling for a breath or caesura.

Divisio objects are created by the following engraver(s): Divisio_engraver (page 461).
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))
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)

If `space-alist` is defined for a grob that gets spaced in a staff, an entry for `first-note` must be present. If there is no `next-note` entry, the value of `first-note` is used instead.

Choices for `spacing-style` are:

- **extra-space**
  - Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.

- **shrink-space**
  - Only compatible with `first-note` and `next-note`. Put this much space between the two grobs. The space is only shrinkable.

- **semi-shrink-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 shrinkable.

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.
Note that many objects have special positioning considerations, which cause any
setting of Y-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).

This object supports the following interface(s): break-aligned-interface (page 752),
breathing-sign-interface (page 755), font-interface (page 764), grob-interface
(page 770), item-interface (page 779), outside-staff-interface (page 797), and
text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.42 DotColumn
An auxiliary grob to align stacked Dots (page 582), grobs of dotted notes and chords.

DotColumn objects are created by the following engraver(s): Dot_column_engraver
(page 461), and Vaticana_ligature_engraver (page 500).

Standard settings:

axes (list):
    '()'  
    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):
    
    Add this much extra space between objects that are next to each other.

X-extent (pair of numbers):
    
    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 743), dot-column-interface (page 759), grob-interface (page 770), and item-interface (page 779).

This object is of class Item (characterized by item-interface (page 779)).

3.1.43 Dots

The dot(s) of a dotted note. See also DotColumn (page 581).

Dots objects are created by the following engraver(s): Dots_engraver (page 462).

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):
    
    The number of dots.

eextra-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).

eextra-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):
    
    The glyph name within the font.

In the context of (span) bar lines or clefs, 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.

   For ties, there is a distinction between exact and inexact values: an exact value serves
   as a rough vertical offset that gets further tuned to make the tie avoid staff lines. An
   inexact value is taken as the precise vertical offset without further adjustments.

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 759),
font-interface (page 764), grob-interface (page 770), item-interface (page 779), and
staff-symbol-referencer-interface (page 817).

This object is of class Item (characterized by item-interface (page 779)).

3.1.44 DoublePercentRepeat
A double-percent symbol for repeating two bars. See also DoublePercentRepeatCounter (page 584), PercentRepeat (page 658), DoubleRepeatSlash (page 586), and RepeatSlash (page 666).

DoublePercentRepeat objects are created by the following engraver(s):
Double_percent_repeat_engraver (page 462).

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 752),
font-interface (page 764), grob-interface (page 770), item-interface (page 779), and
percent-repeat-interface (page 799).

This object is of class Item (characterized by item-interface (page 779)).

3.1.45 DoublePercentRepeatCounter
A grob to print a counter for DoublePercentRepeat (page 583), grobs.

DoublePercentRepeatCounter objects are created by the following engraver(s):
Double_percent_repeat_engraver (page 462).

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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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.

Note that many objects have special positioning considerations, which cause any setting of `X-offset` to be ignored or modified, even though the object supports the `self-alignment-interface` (page 803).

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. Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764), grob-interface (page 770), item-interface (page 779), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

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 658), DoublePercentRepeat (page 583), and RepeatSlash (page 666).

DoubleRepeatSlash objects are created by the following engraver(s):
Slash_repeat_engraver (page 490).

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 764), grob-interface (page 770), item-interface (page 779), outside-staff-interface (page 797), percent-repeat-interface (page 799), and rhythmic-grob-interface (page 801).

This object is of class Item (characterized by item-interface (page 779)).

### 3.1.47 DurationLine

A horizontal duration line, continuing rhythmic items (usually note heads).

DurationLine objects are created by the following engraver(s): Duration_line_engraver (page 463).

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):
  - `((extra-dot-padding . 0.5)
    (hook-direction . 1)
    (hook-height . 0.34)
    (hook-thickness . #f))`

  * An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob's details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob's description section.

- **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.

Note that many objects have special positioning considerations, which cause any setting of **Y-offset** to be ignored or modified, even though the object supports the *self-alignment-interface* (page 803).
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 760), font-interface (page 764), grob-interface (page 770), horizontal-line-spanner-interface (page 776), line-interface (page 783), spanner-interface (page 814), and unbreakable-spanner-interface (page 832).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.48 DynamicLineSpanner
An auxiliary grob providing a vertical baseline to align successive dynamic grobs (DynamicText (page 590), DynamicTextSpanner (page 592), and Hairpin (page 607)) within a staff.

DynamicLineSpanner objects are created by the following engraver(s): Dynamic_align_engraver (page 463).

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.
  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): axis-group-interface (page 743), dynamic-interface (page 761), dynamic-line-spanner-interface (page 761), grob-interface (page 770), outside-staff-interface (page 797), side-position-interface (page 806), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.49 DynamicText
A dynamic text item like ‘ff’ or ‘mp’. See also DynamicLineSpanner (page 589).

DynamicText objects are created by the following engraver(s): Dynamic_engraver (page 464).

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. Common choices are normal and bold. The full list of symbols that can be used is: thin, ultralight, light, semilight, book, normal, medium, semibold, bold, ultrabold, heavy, ultraheavy.

font-shape (symbol):
  'italic
Select the shape of a font. Possible values are upright, italic, oblique, and slanted (which is the same as oblique).

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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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.
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X-offset (number):
   ly:self-alignment-interface::aligned-on-x-parent
   The horizontal amount that this object is moved relative to its X-parent.
   Note that many objects have special positioning considerations, which cause any
   setting of X-offset to be ignored or modified, even though the object supports the
   self-alignment-interface (page 803).

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 at lily/output-lib.scm:1084:3
   (grob)>> >
   The vertical amount that this object is moved relative to its Y-parent.
   Note that many objects have special positioning considerations, which cause any
   setting of Y-offset to be ignored or modified, even though the object supports the
   self-alignment-interface (page 803).

This object supports the following interface(s): dynamic-interface (page 761),
dynamic-text-interface (page 761), font-interface (page 764), grob-interface
(page 770), item-interface (page 779), outside-staff-interface (page 797),
script-interface (page 802), self-alignment-interface (page 803), and text-interface
(page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.50 DynamicTextSpanner

Dynamic text like ‘cresc’, usually followed by a (dashed) line. See also DynamicLineSpanner
(page 589), and TextSpanner (page 714).

DynamicTextSpanner objects are created by the following engraver(s): Dynamic_engraver
(page 464).

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. Possible values are upright, italic, oblique, and slanted (which is the same as oblique).

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 font-size 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 761), dynamic-text-spanner-interface (page 761), font-interface (page 764), grob-interface (page 776), horizontal-line-spanner-interface (page 776), line-interface (page 783), spanner-interface (page 814), and text-interface (page 824).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.51 Episema

An episema line (over a group of notes). Used in Gregorian chant.

Episema objects are created by the following engraver(s): Episema_engraver (page 465).

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.

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): episema-interface (page 762), font-interface (page 764), grob-interface (page 770), horizontal-line-spanner-interface (page 776), line-interface (page 783), side-position-interface (page 806), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.52 FingerGlideSpanner

A line connecting two Fingering (page 597), grobs, usually indicating a gliding finger for stringed instruments.

FingerGlideSpanner objects are created by the following engraver(s):
Finger_glide_engraver (page 466).

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))
  An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

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 762),
font-interface (page 764), grob-interface (page 770), line-spanner-interface
(page 784), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).
### 3.1.53 Fingering

A fingering symbol (usually a digit). See also FingeringColumn (page 599), and StrokeFinger (page 699).

Fingering objects are created by the following engraver(s): Fingering_engraver (page 466), and New_fingering_engraver (page 481).

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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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.

X-padding (dimension, in staff space):
0.3
Add this much extra space between objects that are next to each other horizontally,
overriding the padding property 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.

Remarks:

• If the fingering is left- or right-positioned, the Y-offset property is taken relative to
the vertical position of its X-parent (i.e., its associated note head).

This object supports the following interface(s): finger-interface (page 763),
font-interface (page 764), grob-interface (page 770), item-interface
(page 779), outside-staff-interface (page 797), self-alignment-interface
(page 803), side-position-interface (page 806), text-interface (page 824), and
text-script-interface (page 825).

This object is of class Item (characterized by item-interface (page 779)).
3.1.54 FingeringColumn

An auxiliary grob to align stacked Fingering (page 597), grobs.

FingeringColumn objects are created by the following engraver(s):
Fingering_column_engraver (page 466).

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.

Remarks:
- padding applies to the vertical axis only.

This object supports the following interface(s): fingering-column-interface (page 763),
grob-interface (page 770), and item-interface (page 779).

This object is of class Item (characterized by item-interface (page 779)).

3.1.55 Flag

A flag (in the musical sense).

Flag objects are created by the following engraver(s): Stem_engraver (page 494).

Standard settings:

- color (color):
  #<procedure at lily/output-lib.scm:1529:0 (grob)>
  The color of this grob.

- glyph-name (string):
  ly:flag::glyph-name
  The glyph name within the font.
  In the context of (span) bar lines or clefs, 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 at lily/output-lib.scm:1529:0 (grob)>
  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.
Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.
Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): flag-interface (page 764), font-interface (page 764), grob-interface (page 770), and item-interface (page 779).

This object is of class Item (characterized by item-interface (page 779)).

### 3.1.56 Footnote

A footnote mark (usually a number) with a pointing line attached to another grob.

Footnote objects are created by the following engraver(s): Footnote_engraver (page 467).

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 at lily/output-lib.scm:1485:0 (grob)>
```

If set, footnotes are automatically numbered.

break-visibility (vector):

```
#<procedure at lily/output-lib.scm:3119:0 (grob)>
```

A vector of 3 booleans, #(end-of-line unbroken begin-of-line). #t means visible, #f means killed.

footnote (boolean):

```
#t
```

Should this be a footnote or in-note?
footnote-text (markup):
  #<procedure at lily/output-lib.scm:1485:0 (grob)>
  A footnote for the grob.

stencil (stencil):
  ly:balloon-interface::print
  The symbol to print.

text (markup):
  #<procedure at lily/output-lib.scm:1485:0 (grob)>
  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 at lily/output-lib.scm:1485:0 (grob)>
  The horizontal amount that this object is moved relative to its X-parent.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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 at lily/output-lib.scm:1485:0 (grob)>
  The vertical amount that this object is moved relative to its Y-parent.
  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): balloon-interface (page 745), font-interface (page 764), footnote-interface (page 766), grob-interface (page 770), sticky-grob-interface (page 820), and text-interface (page 824).

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 779), and spanner-interface (page 814).

3.1.57 FretBoard
A fretboard diagram.

FretBoard objects are created by the following engraver(s): Fretboard_engraver (page 467).

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 $\text{thickness} \times (1 + \text{string-thickness-factor})^{(k-1)}$. 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 756), font-interface (page 764), fret-diagram-interface (page 766), grob-interface (page 770), item-interface (page 779), outside-staff-interface (page 797), and rhythmic-grob-interface (page 801).

This object is of class Item (characterized by item-interface (page 779)).

3.1.58 Glissando

A glissando line.

Glissando objects are created by the following engraver(s): Glissando_engraver (page 468).

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): font-interface (page 764),
glissando-interface (page 768), grob-interface (page 770), line-interface
(page 783), line-spanner-interface (page 784), spanner-interface (page 814), and
unbreakable-spanner-interface (page 832).

This object is of class Spanner (characterized by spanner-interface (page 814)).
3.1.59 GraceSpacing
An auxiliary grob to handle (horizontal) spacing of grace notes. See also NoteSpacing (page 654), StaffSpacing (page 691), and SpacingSpanner (page 684).

GraceSpacing objects are created by the following engraver(s): Grace_spacing_engraver (page 469).

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 768), grob-interface (page 770), spacing-options-interface (page 812), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.60 GridChordName
A chord name in a chord grid.

GridChordName objects are created by the following engraver(s):
Grid_chord_name_engraver (page 470).

Standard settings:

- font-family (symbol):
  'sans
  The font family is the broadest category for selecting text fonts. Options include
  serif, sans and typewriter.

- 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 at lily/output-lib.scm:3281:0 (grob)>
  The horizontal amount that this object is moved relative to its X-parent.
  Note that many objects have special positioning considerations, which cause any
  setting of X-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

Y-offset (number):
  #<procedure at lily/output-lib.scm:3281:0 (grob)>
  The vertical amount that this object is moved relative to its Y-parent.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): accidental-switch-interface
  (page 741), font-interface (page 764), grid-chord-name-interface (page 769),
  grob-interface (page 770), spanner-interface (page 814), and text-interface
  (page 824).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.61 GridLine
A vertical line between staves, indicating rhythmic synchronization. See also GridPoint
  (page 607).

GridLine objects are created by the following engraver(s): Grid_line_span_engraver
  (page 470).

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 not a number,
  align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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.
   Note that many objects have special positioning considerations, which cause any
   setting of X-offset to be ignored or modified, even though the object supports the
   self-alignment-interface (page 803).

This object supports the following interface(s): grid-line-interface (page 769),
   grob-interface (page 770), item-interface (page 779), and self-alignment-interface
   (page 803).

This object is of class Item (characterized by item-interface (page 779)).

3.1.62 GridPoint
An auxiliary grob marking a start or end point for a GridLine (page 606), grob.

GridPoint objects are created by the following engraver(s): Grid_point_engraver
   (page 470).

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 770),
   grob-interface (page 770), and item-interface (page 779).

This object is of class Item (characterized by item-interface (page 779)).

3.1.63 Hairpin
A hairpin. See also DynamicLineSpanner (page 589).

Hairpin objects are created by the following engraver(s): Dynamic_engraver (page 464).

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):

```lisp
(#<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.

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): dynamic-interface (page 761), grob-interface (page 770), hairpin-interface (page 774), line-interface (page 783), outside-staff-interface (page 797), self-alignment-interface (page 803), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.64 HorizontalBracket

A horizontal bracket between notes. See also HorizontalBracketText (page 610), and MeasureSpanner (page 638).

HorizontalBracket objects are created by the following engraver(s):
Horizontal_bracket_engraver (page 471).

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.

- **break-overshoot** (pair of numbers):

  ```lisp
  horizontal-bracket::calc-break-overshoot
  ```

  A pair of numbers specifying how much a broken spanner sticks out of its bounds horizontally on the broken side(s). For broken beams and broken tuplet brackets, the bounds are given by the prefatory matter on the left and/or the rightmost column on the right. For broken horizontal brackets, the bounds are the leftmost and/or rightmost column; for broken measure spanners, the left and/or right edge of the staff.

- **connect-to-neighbor** (pair):

  ```lisp
  ly: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.

- **outside-staff-priority** (number):

  `800`

  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.

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 \textit{p} and \textit{f}) on their baselines.

Stencil (stencil):
  \texttt{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 \texttt{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-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.
  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): grob-interface (page 770), horizontal-bracket-interface (page 775), line-interface (page 783), outside-staff-interface (page 797), side-position-interface (page 806), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.65 HorizontalBracketText
Text (markup) for a HorizontalBracket (page 609), grob.
HorizontalBracketText objects are created by the following engraver(s):
Horizontal_bracket_engraver (page 471).

Standard settings:
  direction (direction):
    \texttt{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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

`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.
Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

`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.
Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).
This object supports the following interface(s): accidental-switch-interface (page 741), font-interface (page 764), grob-interface (page 770), horizontal-bracket-text-interface (page 776), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), spanner-interface (page 814), and text-interface (page 824).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.66 InstrumentName

An instrument name, usually displayed to the left of a staff.

InstrumentName objects are created by the following engraver(s):
Instrument_name_engraver (page 471).

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. If not a number, align on the object’s reference point.

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.
  Note that many objects have special positioning considerations, which cause any
  setting of X-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

Y-offset (number):
  system-start-text::calc-y-offset
  The vertical amount that this object is moved relative to its Y-parent.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).
This object supports the following interface(s): accidental-switch-interface (page 741), font-interface (page 764), grob-interface (page 770), self-alignment-interface (page 803), side-position-interface (page 806), spanner-interface (page 814), system-start-text-interface (page 822), and text-interface (page 824).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.67 InstrumentSwitch

This grob is deprecated. Do not use it.

InstrumentSwitch objects are created by the following engraver(s):

Instrument_switch_engraver (page 472).

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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

- **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.

Note that many objects have special positioning considerations, which cause any setting of \( X\)-offset to be ignored or modified, even though the object supports the `self-alignment-interface` (page 803).

**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.

Note that many objects have special positioning considerations, which cause any setting of \( Y\)-offset to be ignored or modified, even though the object supports the `self-alignment-interface` (page 803).

This object supports the following interface(s): accidental-switch-interface (page 741), font-interface (page 764), grob-interface (page 770), item-interface (page 779), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), and text-interface (page 824).

This object is of class Item (characterized by `item-interface` (page 779)).

### 3.1.68 JumpScript

A grob to display a ‘point of departure’ like *D.C. al fine*.

JumpScript objects are created by the following engraver(s): Jump_ engraver (page 472).

**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. Possible values are upright, italic, oblique, and slanted (which is the same as oblique).

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. If not a number, align on the object’s reference point.
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.
   Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.
   Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): break-alignable-interface (page 752), font-interface (page 764), grob-interface (page 770), item-interface (page 779), jump-script-interface (page 781), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

### 3.1.69 KeyCancellation

A key cancellation, normally consisting of naturals, to be displayed (if necessary) immediately before a KeySignature (page 619), grob if the key changes.

KeyCancellation objects are created by the following engraver(s): Key_engraver (page 473).

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 shrink-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)

If space-alist is defined for a grob that gets spaced in a staff, an entry for
first-note must be present. If there is no next-note entry, the value of first-note
is used instead.

Choices for spacing-style are:

extra-space
  Put this much space between the two grobs. The space is stretchable
  and shrinkable 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, with-
  out allowing them to collide. The space is stretchable and shrinkable
  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 and shrinkable.

shrink-space
  Only compatible with first-note and next-note. Put this much
  space between the two grobs. The space is only shrinkable.

semi-shrink-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 shrinkable.

Rules for this spacing are much more complicated than this. See [Wanske] page

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):

```scheme
#<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):

```scheme
#<unpure-pure-container #<procedure ly:staff-symbol-referencer::callback (_)> >
```

The vertical amount that this object is moved relative to its Y-parent.

Note that many objects have special positioning considerations, which cause any setting of *Y-offset* to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): accidental-switch-interface (page 741), break-aligned-interface (page 752), font-interface (page 764), grob-interface (page 770), item-interface (page 779), key-cancellation-interface (page 781), key-signature-interface (page 781), pure-from-neighbor-interface (page 800), and staff-symbol-referencer-interface (page 817).

This object is of class Item (characterized by item-interface (page 779)).

### 3.1.70 KeySignature

A key signature. See also KeyCancellation (page 616).

KeySignature objects are created by the following engraver(s): Key_engraver (page 473).

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)
    (key-cancellation extra-space . 0.3)
    (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 shrink-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)

If `space-alist` is defined for a grob that gets spaced in a staff, an entry for `first-note` must be present. If there is no `next-note` entry, the value of `first-note` is used instead.

Choices for `spacing-style` are:

- `extra-space` Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.
- `shrink-space` Only compatible with `first-note` and `next-note`. Put this much space between the two grobs. The space is only shrinkable.
- `semi-shrink-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 shrinkable.

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.
  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): accidental-switch-interface (page 741), break-aligned-interface (page 752), font-interface (page 764), grob-interface (page 770), item-interface (page 779), key-signature-interface (page 781), pure-from-neighbor-interface (page 800), and staff-symbol-referencer-interface (page 817).

This object is of class Item (characterized by item-interface (page 779)).

3.1.71 KievanLigature
An auxiliary grob to handle a melisma (ligature) as used in Kievan square notation. See also MensuralLigature (page 640), VaticanaLigature (page 731), and LigatureBracket (page 627).

KievanLigature objects are created by the following engraver(s):
Kievan_ligature_engraver (page 474).

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 764), grob-interface (page 770), kievan-ligature-interface (page 782), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).
**3.1.72 LaissezVibrerTie**

A laissez-vibrer tie (i.e., a tie from a note into nothing). See also LaissezVibrerTieColumn (page 624), RepeatTie (page 667), and Tie (page 715).

LaissezVibrerTie objects are created by the following engraver(s):
Laissez_vibrer_engraver (page 475).

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):
  - '((height-limit . 1.0) (ratio . 0.333))
    An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob's details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob's description section.

- **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?

- **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).

- **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):

Two skylines, one above and one below this grob.

Y-extent (pair of numbers):

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): bezier-curve-interface (page 752), grob-interface (page 770), item-interface (page 779), semi-tie-interface (page 805), and tie-interface (page 826).

This object is of class Item (characterized by item-interface (page 779)).

3.1.73 LaissezVibrerTieColumn

An auxiliary grob to determine direction and shape of stacked LaissezVibrerTie (page 623), grobs.

LaissezVibrerTieColumn objects are created by the following engraver(s):
Laissez_vibrer_engraver (page 475).

Standard settings:

head-direction (direction):

Are the note heads left or right in a semitie?

X-extent (pair of numbers):

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

Y-extent (pair of numbers):

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): grob-interface (page 770), item-interface (page 779), and semi-tie-column-interface (page 804).

This object is of class Item (characterized by item-interface (page 779)).

3.1.74 LedgerLineSpanner

An auxiliary grob to manage ledger lines of a whole staff.

LedgerLineSpanner objects are created by the following engraver(s):
Ledger_line_engraver (page 475).

Standard settings:

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.

**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 770), ledger-line-spanner-interface (page 782), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.75 LeftEdge

The left edge of a staff. Useful as an anchor point for other grobs.

LeftEdge objects are created by the following engraver(s): Break_align_engraver (page 454).

**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)

   If space-alist is defined for a grob that gets spaced in a staff, an entry for
   first-note must be present. If there is no next-note entry, the value of first-note
   is used instead.

   Choices for spacing-style are:

     extra-space
     Put this much space between the two grobs. The space is stretchable
     and shrinkable when paired with first-note or next-note; other-
     wise 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 and shrinkable 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 and shrinkable.

shrink-space
Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.

semi-shrink-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 shrinkable.

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 752), grob-interface (page 770), and item-interface (page 779).

This object is of class Item (characterized by item-interface (page 779)).

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 622), MensuralLigature (page 640), and VaticanaLigature (page 731).

LigatureBracket objects are created by the following engraver(s):
Ligature_bracket_engraver (page 475).

Standard settings:

bracket-visibility (boolean or symbol):
#t
This controls the visibility of the tuplet bracket. Setting it to \#f 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: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):**

200

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):**

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 \texttt{Staff.StaffSymbol.thickness}).

tuplet-slur (boolean):
  \#f
  Draw a slur instead of a bracket for tuplets.

X-positions (pair of numbers):
  \texttt{ly:tuplet-bracket::calc-x-positions}
  Pair of X staff coordinates of a spanner in the form (\texttt{left . right}), where both \texttt{left} and \texttt{right} are in staff-space units of the current staff.

This object supports the following interface(s): grob-interface (page 770), line-interface (page 783), outside-staff-interface (page 797), spanner-interface (page 814), and tuplet-bracket-interface (page 830).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.77 LyricExtender
An extender line in lyrics.

LyricExtender objects are created by the following engraver(s): \texttt{Extender_engraver} (page 465).

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 \texttt{springs-and-rods} property. If added to a Tie, this sets the minimum distance between noteheads.

  stencil (stencil):
    \texttt{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 \texttt{Staff.StaffSymbol.thickness}).

This object supports the following interface(s): grob-interface (page 770), lyric-extender-interface (page 786), lyric-interface (page 787), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.78 LyricHyphen
A hyphen in lyrics. See also VowelTransition (page 738).

LyricHyphen objects are created by the following engraver(s): \texttt{Hyphen_engraver} (page 471).

Standard settings:
  after-line-breaking (boolean):
    \texttt{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 764), grob-interface (page 770), lyric-hyphen-interface (page 786), lyric-interface (page 787), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).
3.1.79 LyricRepeatCount

A repeat count in lyrics.

LyricRepeatCount objects are created by the following engraver(s):
Lyric_repeat_count_engraver (page 476).

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):
   'normal
   
   Select the series of a font. Common choices are normal and bold. The full list of
   symbols that can be used is: thin, ultralight, light, semilight, book, normal,
   medium, semibold, bold, ultrabold, heavy, ultraheavy.

font-shape (symbol):
   'italic
   
   Select the shape of a font. Possible values are upright, italic, oblique, and
   slanted (which is the same as oblique).

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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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 at lily/output-lib.scm:1485:0 (grob)>
  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.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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 752), font-interface (page 764), grob-interface (page 770), item-interface (page 779), lyric-interface (page 787), lyric-repeat-count-interface (page 787), self-alignment-interface (page 803), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).
3.1.80 LyricSpace

A space in lyrics.

LyricSpace objects are created by the following engraver(s): Hyphen_engraver (page 471).

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 770), lyric-hyphen-interface (page 786), lyric-space-interface (page 787), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.81 LyricText

A chunk of text in lyrics. See also LyricExtender (page 629), LyricHyphen (page 629), LyricSpace (page 633), and VowelTransition (page 738).

LyricText objects are created by the following engraver(s): Lyric_engraver (page 475).

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):
   'normal
Select the series of a font. Common choices are normal and bold. The full list of
symbols that can be used is: thin, ultralight, light, semilight, book, normal,
medium, semibold, bold, ultrabold, heavy, ultraheavy.

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 not a number,
align on the parent’s reference point. If unset, the value from self-alignment-X
property will be used.

self-alignment-X (number):
   left-align-at-split-notes
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. If not a number, align on the object’s reference point.

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 at lily/output-lib.scm:1485:0 (grob)>
   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):

```latex
\texttt{ly:self-alignment-interface::aligned-on-x-parent}
```

The horizontal amount that this object is moved relative to its X-parent.

Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

Y-extent (pair of numbers):

```latex
\#<\texttt{unpure-pure-container} \#<\texttt{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 764), grob-interface (page 770), item-interface (page 779), lyric-syllable-interface (page 787), rhythmic-grob-interface (page 801), self-alignment-interface (page 803), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

### 3.1.82 MeasureCounter

A grob to print a counter for measures.

MeasureCounter objects are created by the following engraver(s):

Measure_counter_engraver (page 478).

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 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. If not a number, align on the object’s reference point.

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.
  Note that many objects have special positioning considerations, which cause any
  setting of X-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

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.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): centered-spanner-interface (page 755),
font-interface (page 764), grob-interface (page 770), measure-counter-interface
(page 787), outside-staff-interface (page 797), self-alignment-interface (page 803),
side-position-interface (page 806), spanner-interface (page 814), and text-interface
(page 824).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.83 MeasureGrouping
A measure grouping or conducting sign.

MeasureGrouping objects are created by the following engraver(s):
Measure_grouping_engraver (page 478).

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.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): grob-interface (page 770),
measure-grouping-interface (page 788), outside-staff-interface (page 797),
side-position-interface (page 806), and spanner-interface (page 814).
This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.84 MeasureSpanner
A horizontal bracket between bar lines. See also HorizontalBracket (page 609).
MeasureSpanner objects are created by the following engraver(s):
Measure_spanner_engraver (page 478).

Standard settings:
  connect-to-neighbor (pair):
    ly: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. If not a number, align on the object’s reference point.

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.
   Note that many objects have special positioning considerations, which cause any
   setting of Y-offset to be ignored or modified, even though the object supports the
   self-alignment-interface (page 803).

This object supports the following interface(s): accidental-switch-interface
   (page 741), font-interface (page 764), grob-interface (page 770), line-interface
   (page 783), measure-spanner-interface (page 788), outside-staff-interface
   (page 797), self-alignment-interface (page 803), side-position-interface (page 806),
   spanner-interface (page 814), and text-interface (page 824).

This object is of class Spanner (characterized by spanner-interface (page 814)).

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 the following engraver(s): Melody_engraver
   (page 479).

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 770), item-interface (page 779), and melody-spanner-interface (page 789).

This object is of class Item (characterized by item-interface (page 779)).

3.1.86 MensuralLigature

A grob to display a ligature as used in mensural notation. See also KievanLigature (page 622), VaticanaLigature (page 731), and LigatureBracket (page 627).

MensuralLigature objects are created by the following engraver(s):
Mensural_ligature_engraver (page 479).

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 764), grob-interface (page 770), mensural-ligature-interface (page 789), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

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 the following engraver(s):
Metronome_mark_engraver (page 479).

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):
  
  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, 'stacked, 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. If not a number, align on the object’s reference point.

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.
Note that many objects have special positioning considerations, which cause any
setting of X-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).

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.
Note that many objects have special positioning considerations, which cause any
setting of Y-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).

This object supports the following interface(s): break-alignable-interface
  (page 752), font-interface (page 764), grob-interface (page 770), item-interface
  (page 779), metronome-mark-interface (page 790), outside-staff-interface (page 797),
  self-alignment-interface (page 803), side-position-interface (page 806), and
text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.88 MultiMeasureRest
A multi-measure rest. See also MultiMeasureRestNumber (page 644), MultiMeasureRestText
  (page 647), MultiMeasureRestScript (page 646), and Rest (page 669).
MultiMeasureRest objects are created by the following engraver(s):
  Multi_measure_rest_engraver (page 480).

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.

doctored-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. Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764), grob-interface (page 770), multi-measure-interface (page 790), multi-measure-rest-interface (page 791), outside-staff-interface (page 797), rest-interface (page 801), spanner-interface (page 814), and staff-symbol-referencer-interface (page 817).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.89 MultiMeasureRestNumber
A grob to print the length of a MultiMeasureRest (page 642), grob.

MultiMeasureRestNumber objects are created by the following engraver(s): Multi_measure_rest_engraver (page 480).

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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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.

Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764), grob-interface (page 770), multi-measure-interface (page 790), multi-measure-rest-number-interface (page 792), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), spanner-interface (page 814), and text-interface (page 824).

This object is of class Spanner (characterized by spanner-interface (page 814)).
3.1.90 MultiMeasureRestScript

An articulation (like a fermata) attached to a MultiMeasureRest (page 642), grob. See also Script (page 670).

MultiMeasureRestScript objects are created by the following engraver(s): Multi_measure_rest_engraver (page 480).

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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.
  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764), grob-interface (page 770), multi-measure-interface (page 790), outside-staff-interface (page 797), script-interface (page 802), self-alignment-interface (page 803), side-position-interface (page 806), and spanner-interface (page 814). This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.91 MultiMeasureRestText
A text markup for a MultiMeasureRest (page 642), grob. See also TextScript (page 712).

MultiMeasureRestText objects are created by the following engraver(s):
Multi_measure_rest_engraver (page 480).

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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764), grob-interface (page 770), multi-measure-interface (page 790), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), spanner-interface (page 814), and text-interface (page 824).

This object is of class Spanner (characterized by spanner-interface (page 814)).

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 the following engraver(s):
Paper_column_engraver (page 484).

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 743),
font-interface (page 764), grob-interface (page 770), item-interface (page 779),
non-musical-paper-column-interface (page 792), paper-column-interface (page 798),
separation-item-interface (page 806), and spaceable-grob-interface (page 811).

This object is of class Paper_column (characterized by paper-column-interface
(page 798)).

3.1.93 NoteCollision

An auxiliary grob to group NoteColumn (page 651), grobs from several voices, mainly to handle
note collisions. See also RestCollision (page 670).

NoteCollision objects are created by the following engraver(s): Collision_engraver
(page 457).

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 743), grob-interface (page 770), item-interface (page 779), and note-collision-interface (page 793).

This object is of class Item (characterized by item-interface (page 779)).

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 650).

NoteColumn objects are created by the following engraver(s): Rhythmic_column_engraver (page 489).

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 743), bend-interface (page 750), grob-interface (page 770), item-interface (page 779), note-column-interface (page 794), and separation-item-interface (page 806).

This object is of class Item (characterized by item-interface (page 779)).

3.1.95 NoteHead
A note head. See also TabNoteHead (page 707).

NoteHead objects are created by the following engraver(s): Completion_heads_engraver (page 457), Drum_notes_engraver (page 462), and Note_heads_engraver (page 482).

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 or clefs, 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.
   Note that many objects have special positioning considerations, which cause any
   setting of X-offset to be ignored or modified, even though the object supports the
   self-alignment-interface (page 803).

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.
   Note that many objects have special positioning considerations, which cause any
   setting of Y-offset to be ignored or modified, even though the object supports the
   self-alignment-interface (page 803).

This object supports the following interface(s): accidental-participating-head-interface
   (page 740), bend-interface (page 750), font-interface (page 764),
   gregorian-ligature-interface (page 768), grob-interface (page 770), item-interface
   (page 779), ledgered-interface (page 783), ligature-head-interface (page 783),
   mensural-ligature-interface (page 789), note-head-interface (page 794),
   rhythmic-grob-interface (page 801), rhythmic-head-interface (page 801),
   staff-symbol-referencer-interface (page 817), and vaticana-ligature-interface
   (page 832).

This object is of class Item (characterized by item-interface (page 779)).

3.1.96 NoteName
A textual representation of a note name.

NoteName objects are created by the following engraver(s): Note_name_engraver
   (page 482).

Standard settings:

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 not a number,
   align on the parent’s reference point. 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. If not a number, align on the object’s reference point.
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.
    Note that many objects have special positioning considerations, which cause any
    setting of X-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).

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 741), font-interface (page 764), grob-interface (page 770), item-interface
    (page 779), note-name-interface (page 795), self-alignment-interface (page 803), and
    text-interface (page 824).

    This object is of class Item (characterized by item-interface (page 779)).

3.1.97 NoteSpacing
An auxiliary grob to handle (horizontal) spacing of notes. See also GraceSpacing (page 605),
StaffSpacing (page 691), and SpacingSpanner (page 684).

    NoteSpacing objects are created by the following engraver(s): Note_spacing_engraver
    (page 483).

    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 770), item-interface (page 779), note-spacing-interface (page 795), and spacing-interface (page 812).

This object is of class Item (characterized by item-interface (page 779)).

3.1.98 OttavaBracket
An ottava bracket.

OttavaBracket objects are created by the following engraver(s):
Ottava_spanner_engraver (page 483).

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. Common choices are normal and bold. The full list of symbols that can be used is: thin, ultralight, light, semilight, book, normal, medium, semibold, bold, ultrabold, heavy, ultraheavy.

font-shape (symbol):
'italic

Select the shape of a font. Possible values are upright, italic, oblique, and slanted (which is the same as oblique).

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.

  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764),
grob-interface (page 770), horizontal-bracket-interface (page 775), line-interface
(page 783), ottava-bracket-interface (page 796), outside-staff-interface (page 797),
side-position-interface (page 806), spanner-interface (page 814), and text-interface
(page 824).

This object is of class Spanner (characterized by spanner-interface (page 814)).

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 649).

PaperColumn objects are created by the following engraver(s): Paper_column_engraver
(page 484).

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-alignment-extent (pair of numbers):
  '(0 . 1.35)
  If a grob wants to align itself on a PaperColumn grob that doesn’t contain note heads, use this horizontal extent as a placeholder.

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 743), font-interface (page 764), grob-interface (page 770), item-interface (page 779), musical-paper-column-interface (page 792), paper-column-interface (page 798), separation-item-interface (page 806), and spaceable-grob-interface (page 811).

This object is of class Paper_column (characterized by paper-column-interface (page 798)).

3.1.100 Parentheses
A grob to create parentheses around other grobs.

Parentheses objects are created by the following engraver(s): Parenthesis_engraver (page 484).

Standard settings:

break-visibility (vector):
  #'<procedure at lily/output-lib.scm:3119:0 (grob)>
  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.

Y-extent (pair of numbers):
  #<unpure-pure-container #<procedure parentheses-interface::calc-Y-extent (grob)> >
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
  #<unpure-pure-container #<procedure at lily/output-lib.scm:1035:0 (grob . rest)> >
  The vertical amount that this object is moved relative to its Y-parent.
  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764),
grob-interface (page 770), parentheses-interface (page 798), and
sticky-grob-interface (page 820).

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 779), and spanner-interface (page 814).

### 3.1.101 PercentRepeat

A percent symbol for repeating a bar. See also PercentRepeatCounter (page 660), DoublePercentRepeat (page 583), DoubleRepeatSlash (page 586), and RepeatSlash (page 666).

PercentRepeat objects are created by the following engraver(s):
Percent_repeat_engraver (page 485).

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. If not a number, align on the object’s reference point.

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.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): centered-spanner-interface (page 755), font-interface (page 764), grob-interface (page 770), multi-measure-rest-interface (page 791), percent-repeat-interface (page 799), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).
3.1.102 **PercentRepeatCounter**

A grob to print a counter for PercentRepeat (page 658), grobs.

PercentRepeatCounter objects are created by the following engraver(s):
Percent_repeat_engraver (page 485).

Standard settings:

```plaintext
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.
```

```plaintext
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).
```

```plaintext
font-features (list):

'("cv47")

Opentype features.
```

```plaintext
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.
```

```plaintext
padding (dimension, in staff space):

0.2

Add this much extra space between objects that are next to each other.
```

```plaintext
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 not a number,
align on the parent’s reference point. If unset, the value from self-alignment-X
property will be used.
```

```plaintext
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. If not a number, align on the object’s reference point.
```

```plaintext
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.
Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.
Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764), grob-interface (page 770), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), spanner-interface (page 814), and text-interface (page 824).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.103 PhrasingSlur

A phrasing slur, indicating a ‘musical sentence’. See also Slur (page 680).

PhrasingSlur objects are created by the following engraver(s): Phrasing_slur_engraver (page 485).

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):
    '(((absolute-closeness-measure . 0.3)
      (accidental-collision . 3)
      (close-to-edge-length . 2.5)
      (edge-attraction-factor . 4)
      (edge-slope-exponent . 1.7)
      (encompass-object-range-overshoot . 0.5)
      (extra-encompass-collision-distance . 0.8)
      (extra-encompass-free-distance . 0.3)
      (extra-object-collision-penalty . 50)
      (free-head-distance . 0.3)
An list of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

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):
  0.333
  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):
  1.2
  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 752),
grob-interface (page 770), outside-staff-interface (page 797), slur-interface
(page 809), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.104 PianoPedalBracket
A piano pedal bracket. It can also be part of SostenutoPedal (page 682), SustainPedal
(page 700), or UnaCordaPedal (page 728), grobs if they are printed in a bracketed style.

PianoPedalBracket objects are created by the following engraver(s):
Piano_pedal_engraver (page 486).

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: \((\text{left-height} . \text{right-height})\).

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):
\texttt{ly:piano-pedal-bracket::print}
The symbol to print.

style (symbol):
'\texttt{line}\nThis 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 \texttt{Staff.StaffSymbol.thickness}).

vertical-skylines (pair of skylines):
#\langle\texttt{unpure-pure-container #\langle\texttt{procedure ly:grob::vertical-skylines-from-stencil _\rangle #\langle\texttt{procedure ly:grob::pure-simple-vertical-skylines-from-extents _ _\rangle}}\rangle
Two skylines, one above and one below this grob.

This object supports the following interface(s): grob-interface (page 770), line-interface (page 783), piano-pedal-bracket-interface (page 799), piano-pedal-interface (page 800), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.105 RehearsalMark

A rehearsal mark.

RehearsalMark objects are created by the following engraver(s): \texttt{Mark_engraver} (page 476).

Standard settings:

after-line-breaking (boolean):
\texttt{ly:side-position-interface::move-to-extremal-staff}\nDummy property, used to trigger callback for after-line-breaking.

baseline-skip (dimension, in staff space):
2\nDistance between base lines of multiple lines of text.

break-align-symbols (list):
'\texttt{(staff-bar key-signature clef)}\nA 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 \textit{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.

eextra-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. If not a number, align on the object’s reference point.

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.
    Note that many objects have special positioning considerations, which cause any
    setting of X-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).

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.
    Note that many objects have special positioning considerations, which cause any
    setting of Y-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).

This object supports the following interface(s): accidental-switch-interface
    (page 741), break-alignable-interface (page 752), font-interface (page 764),
    grob-interface (page 770), item-interface (page 779), mark-interface (page 787),
    outside-staff-interface (page 797), rehearsal-mark-interface (page 800),
    self-alignment-interface (page 803), side-position-interface (page 806), and
    text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

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 658),
DoublePercentRepeat (page 583), and DoubleRepeatSlash (page 586).

RepeatSlash objects are created by the following engraver(s): Slash_repeat_engraver
    (page 490).

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 770), item-interface (page 779), percent-repeat-interface (page 799), and rhythmic-grob-interface (page 801).

This object is of class Item (characterized by item-interface (page 779)).

3.1.107 RepeatTie

A repeat tie (i.e., a tie from nothing to a note). See also RepeatTieColumn (page 668), LaissezVibrerTie (page 623), and Tie (page 715).

RepeatTie objects are created by the following engraver(s): Repeat_tie_engraver (page 488).

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):
  '((height-limit . 1.0) (ratio . 0.333))

An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

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?

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).

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 (_)> >
  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 752), grob-interface (page 770), item-interface (page 779), semi-tie-interface (page 805), and tie-interface (page 826).

This object is of class Item (characterized by item-interface (page 779)).

3.1.108 RepeatTieColumn
An auxiliary grob to determine direction and shape of stacked RepeatTie (page 667), grobs.

RepeatTieColumn objects are created by the following engraver(s): Repeat_tie_engraver (page 488).

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):

This object supports the following interface(s): grob-interface (page 770), item-interface (page 779), and semi-tie-column-interface (page 804).

This object is of class Item (characterized by item-interface (page 779)).

3.1.109 Rest

An ordinary rest. See also MultiMeasureRest (page 642).

Rest objects are created by the following engraver(s): Completion_rest_engraver (page 458), and Rest_engraver (page 488).

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.
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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.

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764), grob-interface (page 770), item-interface (page 779), rest-interface (page 801), rhythmic-grob-interface (page 801), rhythmic-head-interface (page 801), and staff-symbol-referencer-interface (page 817).

This object is of class Item (characterized by item-interface (page 779)).

3.1.110 RestCollision

An auxiliary grob to handle rest collisions of different voices. See also NoteCollision (page 650).

RestCollision objects are created by the following engraver(s):
Rest_collision_engraver (page 488).

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 770), item-interface (page 779), and rest-collision-interface (page 801).

This object is of class Item (characterized by item-interface (page 779)).

3.1.111 Script

An articulation (staccato, accent, etc.). See also ScriptColumn (page 672), ScriptRow (page 672), and MultiMeasureRestScript (page 646).

Script objects are created by the following engraver(s): Drum_notes_engraver (page 462), New_fingering_engraver (page 481), and Script_engraver (page 489).

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. If not a number, align on the object’s reference point.

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.
    Note that many objects have special positioning considerations, which cause any
    setting of X-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).

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.
    Note that many objects have special positioning considerations, which cause any
    setting of Y-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).
This object supports the following interface(s): font-interface (page 764),
grob-interface (page 770), item-interface (page 779), outside-staff-interface
(page 797), script-interface (page 802), self-alignment-interface (page 803), and
side-position-interface (page 806).

This object is of class Item (characterized by item-interface (page 779)).

3.1.112 ScriptColumn

An auxiliary grob to (vertically) align stacked Script (page 670), grobs.

ScriptColumn objects are created by the following engraver(s):
Non_musical_script_column_engraver (page 481), and Script_column_engraver
(page 489).

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 770),
item-interface (page 779), and script-column-interface (page 802).

This object is of class Item (characterized by item-interface (page 779)).

3.1.113 ScriptRow

An auxiliary grob to horizontally align stacked Script (page 670), grobs.

ScriptRow objects are created by the following engraver(s): Script_row_engraver
(page 489).

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 770),
item-interface (page 779), and script-column-interface (page 802).

This object is of class Item (characterized by item-interface (page 779)).

3.1.114 SectionLabel

A section label, for example ‘Coda’.

SectionLabel objects are created by the following engraver(s): Mark_engraver
(page 476).

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 it is very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

**outside-staff-priority (number):**

```
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. If not a number, align on the object’s reference point.
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.
    Note that many objects have special positioning considerations, which cause any
    setting of X-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).

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.
    Note that many objects have special positioning considerations, which cause any
    setting of Y-offset to be ignored or modified, even though the object supports the
    self-alignment-interface (page 803).

This object supports the following interface(s): break-alignable-interface
    (page 752), font-interface (page 764), grob-interface (page 770), item-interface
    (page 779), outside-staff-interface (page 797), section-label-interface (page 803),
    self-alignment-interface (page 803), side-position-interface (page 806), and
    text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.115 SegnoMark

A segno mark (created with \repeat segno, not with \segno).

SegnoMark objects are created by the following engraver(s): Mark_engraver (page 476).

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. If not a number, align on the object’s reference point.
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.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.
  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): break-alignable-interface (page 752), font-interface (page 764), grob-interface (page 770), item-interface (page 779), mark-interface (page 787), outside-staff-interface (page 797), segno-mark-interface (page 803), self-alignment-interface (page 803), side-position-interface (page 806), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.116 SignumRepetitionis

An ancient end-repeat sign.

SignumRepetitionis objects are created by the following engraver(s):
Signum_repetitionis_engraver (page 490).

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 at lily/output-lib.scm:1540:0 (grob)>
  The glyph name within the font.
  In the context of (span) bar lines or clefs, 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).

short-bar-extent (pair of numbers):
  ly:bar-line::calc-short-bar-extent
  The Y-extent of a short bar line. The default is half the normal bar extent, rounded up to an integer number of staff spaces.

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)

If space-alist is defined for a grob that gets spaced in a staff, an entry for first-note must be present. If there is no next-note entry, the value of first-note is used instead.
Choices for spacing-style are:

extra-space
   Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.

shrink-space
   Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.

semi-shrink-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 shrinkable.

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 752), font-interface (page 764), grob-interface (page 770), item-interface (page 779), pure-from-neighbor-interface (page 800), and signum-repetitionis-interface (page 808).

This object is of class Item (characterized by item-interface (page 779)).
3.1.117 Slur

A slur. See also PhrasingSlur (page 661).

Slur objects are created by the following engraver(s): Slur_engraver (page 491).

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):

'((absolute-closeness-measure . 0.3)
  (accidental-collision . 3)
  (close-to-edge-length . 2.5)
  (edge-attraction-factor . 4)
  (edge-slope-exponent . 1.7)
  (encompass-object-range-overshoot . 0.5)
  (extra-encompass-collision-distance . 0.8)
  (extra-encompass-free-distance . 0.3)
  (extra-object-collision-penalty . 50)
  (free-head-distance . 0.3)
  (free-slur-distance . 0.8)
  (gap-to-staffline-inside . 0.2)
  (gap-to-staffline-outside . 0.1)
  (head-encompass-penalty . 1000.0)
  (head-slur-distance-factor . 10)
  (head-slur-distance-max-ratio . 3)
  (max-slope . 1.1)
  (max-slope-factor . 10)
  (non-horizontal-penalty . 15)
  (region-size . 4)
  (same-slope-penalty . 20)
  (slur-tie-extrema-min-distance . 0.2)
  (slur-tie-extrema-min-distance-penalty . 2)
  (steeper-slope-factor . 50)
  (stem-encompass-penalty . 30.0))

An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects],
page 520, for more information on the available parameters and their default values
of a particular grob's details property. See Section 3.2 [Graphical Object Interfaces],
page 739, for documentation of the available parameters. Supporting interfaces can
be found at the bottom of a grob's description section.

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.

`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.

`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):

```lisp
#<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 752), grob-interface (page 770), outside-staff-interface (page 797), slur-interface (page 809), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.118 SostenutoPedal

A sostenuto pedal mark. See also SostenutoPedalLineSpanner (page 683), PianoPedalBracket (page 663), SustainPedal (page 700), and UnaCordaPedal (page 728).

SostenutoPedal objects are created by the following engraver(s): Piano_pedal_engraver (page 486).

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. Possible values are upright, italic, oblique, and slanted (which is the same as oblique).

- **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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.
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.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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 764),
  grob-interface (page 770), item-interface (page 779), piano-pedal-script-interface
  (page 800), self-alignment-interface (page 803), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.119 SostenutoPedalLineSpanner
An auxiliary grob providing a baseline to align consecutive SostenutoPedal (page 682), grobs vertically.

SostenutoPedalLineSpanner objects are created by the following engraver(s):
Piano_pedal_align_engraver (page 486).

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.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): axis-group-interface (page 743),
  grob-interface (page 770), outside-staff-interface (page 797), piano-pedal-interface
  (page 800), side-position-interface (page 806), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

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 605), NoteSpacing (page 654), and StaffSpacing (page 691).

SpacingSpanner objects are created by the following engraver(s): Spacing_engraver
  (page 491).

Standard settings:

  average-spacing-wishes (boolean):
    #t
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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 770),
spacing-options-interface (page 812), spacing-spanner-interface (page 812), and
spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

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 686).

SpanBar objects are created by the following engraver(s): Span_bar_engraver (page 492).

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 or clefs, 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 745),
break-aligned-interface (page 752), font-interface (page 764), grob-interface
(page 770), item-interface (page 779), and span-bar-interface (page 813).

This object is of class Item (characterized by item-interface (page 779)).

3.1.122 SpanBarStub
An auxiliary grob, acting like a fake SpanBar (page 685), grob in contexts such as Lyrics
(page 216), that are crossed by a span bar, to keep span bars taking horizontal space.

SpanBarStub objects are created by the following engraver(s): Span_bar_stub_engraver
(page 492).

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 at lily/output-lib.scm:1529:0 (grob)>
Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

Y-extent (pair of numbers):
#<unpure-pure-container #f #<procedure pure-from-neighbor-interface::pure-height (grob beg end)>>
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): grob-interface (page 770), item-interface (page 779), and pure-from-neighbor-interface (page 800).

This object is of class Item (characterized by item-interface (page 779)).

3.1.123 StaffEllipsis
A visual marker (usually three consecutive dots) to indicate that typesetting of music is skipped.

StaffEllipsis objects are created by the following engraver(s):
Skip_typesetting_engraver (page 490).

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)
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)

If space-alist is defined for a grob that gets spaced in a staff, an entry for first-note must be present. If there is no next-note entry, the value of first-note is used instead.

Choices for spacing-style are:

- **extra-space**
  - Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.

- **shrink-space**
  - Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.

- **semi-shrink-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 shrinkable.
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 (layout props args)>
     (%<procedure null-markup (layout props)>)
     (%<procedure musicglyph-markup (layout props glyph-name)>
       "dots.dot")
     (%<procedure musicglyph-markup (layout props glyph-name)>
       "dots.dot")
     (%<procedure musicglyph-markup (layout props glyph-name)>
       "dots.dot")
     (%<procedure null-markup (layout props)>>))
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 underly-
ing 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 752),
font-interface (page 764), grob-interface (page 770), item-interface (page 779), and
text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.124 StaffGrouper
An auxiliary grob to manage vertical spacing of staff groups. See also VerticalAlignment
(page 732), and VerticalAxisGroup (page 732).

StaffGrouper objects are created by the following engraver(s):
Vertical_align_engraver (page 500).

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 770), spanner-interface (page 814), and staff-grouper-interface (page 815).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.125 StaffHighlight

A colored span to highlight a music passage.

**StaffHighlight** objects are created by the following engraver(s):

Staff_highlight_engraver (page 493).

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 at lily/output-lib.scm:1485:0 (grob)>
  ```
  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 770), spanner-interface (page 814), and staff-highlight-interface (page 816).

 This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.126 StaffSpacing
An auxiliary grob to handle spacing within a staff. See also NoteSpacing (page 654), GraceSpacing (page 605), and SpacingSpanner (page 684).

StaffSpacing objects are created by the following engraver(s):

Separating_line_group_engraver (page 489).

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 770), item-interface (page 779), spacing-interface (page 812), and staff-spacing-interface (page 816).

 This object is of class Item (characterized by item-interface (page 779)).

### 3.1.127 StaffSymbol
A staff symbol, usually five horizontal lines.

StaffSymbol objects are created by the following engraver(s): Staff_symbol_engraver (page 493), and Tab_staff_symbol_engraver (page 496).

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.

**line-positions (list):**

ly:staff-symbol::calc-line-positions

Vertical positions 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 770), spanner-interface (page 814), and staff-symbol-interface (page 816).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.128 StanzaNumber

A stanza number (or markup) for lyrics.

StanzaNumber objects are created by the following engraver(s): Stanza_number_engraver (page 494).

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. Common choices are normal and bold. The full list of
  symbols that can be used is: thin, ultralight, light, semilight, book, normal,
  medium, semibold, bold, ultrabold, heavy, ultraheavy.

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.
  Note that many objects have special positioning considerations, which cause any
  setting of X-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

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 764),
  grob-interface (page 770), item-interface (page 779), side-position-interface
  (page 806), stanza-number-interface (page 817), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.129 Stem
A stem. See also StemStub (page 695).

Stem objects are created by the following engraver(s): Span_stem_engraver (page 492),
  and Stem_engraver (page 494).

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 beam-
  let 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):
  '((beamed-extreme-minimum-free-lengths 2.0 1.25)
   (beamed-lengths 3.26 3.5 3.6)
   (beamed-minimum-free-lengths 1.83 1.5 1.25)
   (lengths 3.5 3.5 3.5 4.25 5.0 6.0 7.0 8.0 9.0)
   (stem-shorten 1.0 0.5 0.25))
  An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects],
  page 520, for more information on the available parameters and their default values
  of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces],
  page 739, for documentation of the available parameters. Supporting interfaces can
  be found at the bottom of a grob’s description section.

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.
   Note that many objects have special positioning considerations, which cause any
   setting of X-offset to be ignored or modified, even though the object supports the
   self-alignment-interface (page 803).

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.
   Note that many objects have special positioning considerations, which cause any
   setting of Y-offset to be ignored or modified, even though the object supports the
   self-alignment-interface (page 803).

This object supports the following interface(s): grob-interface (page 770),
item-interface (page 779), and stem-interface (page 818).

This object is of class Item (characterized by item-interface (page 779)).

3.1.130 StemStub
An auxiliary grob that prevents cross-staff Stem (page 693), grobs from colliding with articula-
tions.

StemStub objects are created by the following engraver(s): Stem_engraver (page 494).
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 \((-\infty, 0\) . \(+\infty, 0\)).

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 (grob beg end)>>`

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): `grob-interface` (page 770), and `item-interface` (page 779).

This object is of class Item (characterized by `item-interface` (page 779)).

### 3.1.131 StemTremolo

A stem tremolo.

StemTremolo objects are created by the following engraver(s): `Stem_engraver` (page 494).

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 not a number, align on the parent’s reference point. 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.
  Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.
  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): grob-interface (page 770), item-interface (page 779), self-alignment-interface (page 803), and stem-tremolo-interface (page 820).

This object is of class Item (characterized by item-interface (page 779)).

3.1.132 StringNumber
A markup (by default a digit in a circle) to name a string.

StringNumber objects are created by the following engraver(s): New_fingering_engraver (page 481).

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.

correction (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 not a number,
  align on the parent’s reference point. If unset, the value from self-alignment-X
  property will be used.

script-priority (number):
  150
  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. If not a number, align on the object’s reference point.

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 764),
grob-interface (page 770), item-interface (page 779), number-interface (page 796),
outside-staff-interface (page 797), self-alignment-interface (page 803),
side-position-interface (page 806), string-number-interface (page 821),
text-interface (page 824), and text-script-interface (page 825).

This object is of class Item (characterized by item-interface (page 779)).

3.1.133 StrokeFinger
A markup (usually a lowercase letter) to indicate right-hand fingering. See also Fingering (page 597).

StrokeFinger objects are created by the following engraver(s): New_fingering_engraver (page 481).

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. Possible values are upright, italic, oblique, and slanted (which is the same as oblique).
    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 not a number, align on the parent’s reference point. If unset, the value from self-alignment-X property will be used.

\textit{script-priority} (number):
125
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.

\textit{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. If not a number, align on the object’s reference point.

\textit{self-alignment-Y} (number):
0
Like \textit{self-alignment-X} but for the Y axis.

\textit{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 \textit{p} and \textit{f}) on their baselines.

\textit{stencil} (stencil):
ly:text-interface::print
The symbol to print.

\textit{text} (markup):
stroke-finger::calc-text
Text markup. See Section “Formatting text” in \textit{Notation Reference}.

\textit{Y-extent} (pair of numbers):
\textit{#<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): \textit{font-interface} (page 764), \textit{grob-interface} (page 770), \textit{item-interface} (page 779), \textit{outside-staff-interface} (page 797), \textit{self-alignment-interface} (page 803), \textit{side-position-interface} (page 806), \textit{stroke-finger-interface} (page 821), \textit{text-interface} (page 824), and \textit{text-script-interface} (page 825).

This object is of class Item (characterized by \textit{item-interface} (page 779)).

3.1.134 \textbf{SustainPedal}
A sustain pedal mark. See also \textit{SustainPedalLineSpanner} (page 701), \textit{PianoPedalBracket} (page 663), \textit{SostenutoPedal} (page 682), and \textit{UnaCordaPedal} (page 728).

\textit{SustainPedal} objects are created by the following engraver(s): \textit{Piano_pedal_engraver} (page 486).

Standard settings:

\textit{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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

**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.

Note that many objects have special positioning considerations, which cause any setting of **X-offset** to be ignored or modified, even though the object supports the **self-alignment-interface** (page 803).

**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 764), **grob-interface** (page 770), **item-interface** (page 779), **piano-pedal-interface** (page 800), **piano-pedal-script-interface** (page 800), **self-alignment-interface** (page 803), and **text-interface** (page 824).

This object is of class Item (characterized by **item-interface** (page 779)).

### 3.1.135 SustainPedalLineSpanner

An auxiliary grob providing a baseline to align consecutive SustainPedal (page 700), grobs vertically.

SustainPedalLineSpanner objects are created by the following engraver(s):

Piano_pedal_align_engraver (page 486).
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):

#:unction #<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):

#:unction #<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):

The vertical amount that this object is moved relative to its Y-parent.

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): axis-group-interface (page 743), grob-interface (page 770), outside-staff-interface (page 797), piano-pedal-interface (page 800), side-position-interface (page 806), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

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):

\texttt{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): \texttt{axis-group-interface} (page 743), grob-interface (page 770), outside-staff-axis-group-interface (page 796), spanner-interface (page 814), and system-interface (page 821).

This object is of class System (characterized by system-interface (page 821)).

\textbf{3.1.137 SystemStartBar}

A bar line as a system start delimiter.

SystemStartBar objects are created by the following engraver(s):
System\_start\_delimiter\_engraver (page 494).

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 \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object. Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP}=1, \texttt{DOWN}=-1, \texttt{LEFT}=-1, \texttt{RIGHT}=1, \texttt{CENTER}=0.

padding (dimension, in staff space):
-0.1
Add this much extra space between objects that are next to each other.

stencil (stencil):
\texttt{ly:system-start-delimiter::print}
The symbol to print.

style (symbol):
\texttt{‘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 \texttt{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.
   Note that many objects have special positioning considerations, which cause any
setting of X-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).

This object supports the following interface(s): grob-interface (page 770),
side-position-interface (page 806), spanner-interface (page 814), and
system-start-delimiter-interface (page 822).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.138 SystemStartBrace

A brace as a system start delimiter.

SystemStartBrace objects are created by the following engraver(s):
System_start_delimiter_engraver (page 494).

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.
      Note that many objects have special positioning considerations, which cause any
setting of X-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).
This object supports the following interface(s): font-interface (page 764),
grob-interface (page 770), side-position-interface (page 806), spanner-interface
(page 814), and system-start-delimiter-interface (page 822).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.139 SystemStartBracket
A bracket as a system start delimiter.

SystemStartBracket objects are created by the following engraver(s):
System_start_delimiter_engraver (page 494).

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.
Note that many objects have special positioning considerations, which cause any
setting of X-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764),
grob-interface (page 770), side-position-interface (page 806), spanner-interface
(page 814), and system-start-delimiter-interface (page 822).

This object is of class Spanner (characterized by spanner-interface (page 814)).
3.1.140 **SystemStartSquare**

A rectangle-like bracket as a start delimiter.

*SystemStartSquare* objects are created by the following engraver(s):
*System_start_delimiter_engraver* (page 494).

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.

- **stencil** (stencil):
  - ly:system-start-delimiter::print
    - The symbol to print.

- **style** (symbol):
  - 'line-bracket
    - 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`).

- **X-offset** (number):
  - ly:side-position-interface::x-aligned-side
    - The horizontal amount that this object is moved relative to its X-parent.
    
    Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764), grob-interface (page 770), side-position-interface (page 806), spanner-interface (page 814), and system-start-delimiter-interface (page 822).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.141 **TabNoteHead**

A ‘note head’ (usually a digit) in a tablature. See also NoteHead (page 652).

*TabNoteHead* objects are created by the following engraver(s): Tab_note_heads_ engraver (page 495).
Standard settings:

bend-me (boolean):
'()
Decide whether this grob is bent.

details (alist, with symbols as keys):
'((cautionary-properties
  (angularity . 0.4)
  (half-thickness . 0.075)
  (padding . 0)
  (procedure
    #<procedure parenthesize-stencil (stencil half-thickness width angularity padding)>
  )
  (width . 0.25))
  (harmonic-properties
    (angularity . 2)
    (half-thickness . 0.075)
    (padding . 0)
    (procedure
      #<procedure parenthesize-stencil (stencil half-thickness width angularity padding)>
    )
    (width . 0.25))
  (head-offset . 3/5)
  (repeat-tied-properties
    (note-head-visible . #t)
    (parenthesize . #t))
  (tied-properties (parenthesize . #t)))

An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

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. Common choices are normal and bold. The full list of symbols that can be used is: thin, ultralight, light, semilight, book, normal, medium, semibold, bold, ultrabold, heavy, ultraheavy.

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 underly-
  ing 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.
  Note that many objects have special positioning considerations, which cause any
  setting of X-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

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.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): bend-interface (page 750),
font-interface (page 764), grob-interface (page 770), item-interface
(page 779), note-head-interface (page 794), rhythmic-grob-interface (page 801),
rhythmic-head-interface (page 801), staff-symbol-referencer-interface (page 817),
tab-note-head-interface (page 823), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).
3.1.142 TextMark

An arbitrary textual mark. See also SectionLabel (page 672), and JumpScript (page 614), for grobs with a more specific intent.

TextMark objects are created by the following engraver(s): Text_mark_engraver (page 496).

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. If not a number, align on the object’s reference point.

Stencil (stencil):
ly: text-interface::print
The symbol to print.

text (markup):
#<procedure at lily/output-lib.scm:1485:0 (grob)>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.
Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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.
Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).
This object supports the following interface(s): accidental-switch-interface (page 741), break-alignable-interface (page 752), font-interface (page 764), grob-interface (page 770), item-interface (page 779), mark-interface (page 787), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), text-interface (page 824), and text-mark-interface (page 825).

This object is of class Item (characterized by item-interface (page 779)).

3.1.143 TextScript

A markup attached to a grob like a note head. See also MultiMeasureRestText (page 647).

TextScript objects are created by the following engraver(s): Text_engraver (page 496).

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 it is very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

outside-staff-priority (number):
  450
  
  If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller outside-staff-priority is closer to the staff.

padding (dimension, in staff space):
  0.3
  
  Add this much extra space between objects that are next to each other.

parent-alignment-X (number):
  #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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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.
Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

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):

\[
\begin{align*}
\text{#:unpure-pure-container} & \text{#:procedure ly:side-position-interface::y-aligned-side} \\
(\text{#:optional}) & \text{#:procedure ly:side-position-interface::pure-y-aligned-side} \\
(\text{#:optional}) & >
\end{align*}
\]

The vertical amount that this object is moved relative to its Y-parent.

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): accidental-switch-interface (page 741), font-interface (page 764), grob-interface (page 770), instrument-specific-markup-interface (page 777), item-interface (page 779), outside-staff-interface (page 797), self-alignment-interface (page 803), side-position-interface (page 806), text-interface (page 824), and text-script-interface (page 825).

This object is of class Item (characterized by item-interface (page 779)).

3.1.144 TextSpanner

Text like ‘rit’, usually followed by a (dashed) line. See also DynamicTextSpanner (page 592).

TextSpanner objects are created by the following engraver(s): Text_spanner_engraver (page 497).

Standard settings:

bound-details (alist, with symbols as keys):

\[
\begin{align*}
'((\text{left} \text{ (padding} . \text{0.25}) \text{ (attach-dir} . \text{-1})) \\
(\text{left-broken} \text{ (attach-dir} . \text{1})) \\
(\text{right} \text{ (padding} . \text{0.25}))
\end{align*}
\]

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. Possible values are upright, italic, oblique, and slanted (which is the same as oblique).

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.
  Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

  This object supports the following interface(s): font-interface (page 764),
  grob-interface (page 770), horizontal-line-spanner-interface
  (page 776), line-interface (page 783), outside-staff-interface (page 797),
  side-position-interface (page 806), and spanner-interface (page 814).

  This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.145 Tie
A tie. See also TieColumn (page 717), LaissezVibrerTie (page 623), and RepeatTie (page 667).

  Tie objects are created by the following engraver(s): Completion_heads_engraver
  (page 457), and Tie_engraver (page 497).

  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):
   '((between-length-limit . 1.0)
    (center-staff-line-clearance . 0.6)
    (dot-collision-clearance . 0.25)
    (dot-collision-penalty . 0.25)
    (height-limit . 1.0)
    (horizontal-distance-penalty-factor . 10)
    (intra-space-threshold . 1.25)
    (min-length . 1.0)
    (min-length-penalty-factor . 26)
    (multi-tie-region-size . 3)
    (note-head-gap . 0.2)
    (outer-tie-length-symmetry-penalty-factor . 10)
    (outer-tie-vertical-distance-symmetry-penalty-factor . 10)
    (outer-tie-vertical-gap . 0.25)
    (ratio . 0.333)
    (same-dir-as-stem-penalty . 8)
    (single-tie-region-size . 4)
    (skyline-padding . 0.05)
    (staff-line-collision-penalty . 5)
    (stem-gap . 0.35)
    (tie-column-monotonicity-penalty . 100)
    (tie-tie-collision-distance . 0.45)
    (tie-tie-collision-penalty . 25.0)
    (tip-staff-line-clearance . 0.45)
    (vertical-distance-penalty-factor . 7)
    (wrong-direction-offset-penalty . 10))

An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

direction (direction):
   ly:tie::calc-direction
   If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

font-size (number):
   -6
The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

**line-thickness (number):**

0.8

For slurs and ties, this is the diameter of the virtual “pen” that draws the two arcs of the curve’s outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to Staff.StaffSymbol.thickness).

**neutral-direction (direction):**

1

Which direction to take in the center of the staff.

**springs-and-rods (boolean):**

ly:spanner::set-spacing-rods

Dummy variable for triggering spacing routines.

**stencil (stencil):**

ly:tie::print

The symbol to print.

**thickness (number):**

1.2

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to Staff.StaffSymbol.thickness).

**vertical-skylines (pair of skylines):**

Two skylines, one above and one below this grob.

This object supports the following interface(s): bezier-curve-interface (page 752), grob-interface (page 770), spanner-interface (page 814), and tie-interface (page 826).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.146 TieColumn

An auxiliary grob to determine direction and shape of stacked Tie (page 715), grobs.

TieColumn objects are created by the following engraver(s): Completion_heads_engraver (page 457), and Tie_engraver (page 497).

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):
  
  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 770), spanner-interface (page 814), and tie-column-interface (page 826).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.147 TimeSignature

A time signature.

TimeSignature objects are created by the following engraver(s):

Time_signature_engraver (page 498).

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.
senza-misura-stencil (stencil):
  #f
  The symbol to print when TimeSignature.fraction is not set. Overriding
  TimeSignature.stencil circumvents this.
space-alist (alist, with symbols as keys):
  '(((ambitus extra-space . 1.0)
    (cue-clef extra-space . 1.5)
    (first-note semi-shrink-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)
If space-alist is defined for a grob that gets spaced in a staff, an entry for
first-note must be present. If there is no next-note entry, the value of first-note
is used instead.
Choices for spacing-style are:
  extra-space
    Put this much space between the two grobs. The space is stretchable
    and shrinkable when paired with first-note or next-note; other-
    wise it is fixed.
  minimum-space
    Put at least this much space between the left sides of both grobs, with-
    out allowing them to collide. The space is stretchable and shrinkable
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 and shrinkable.

shrink-space
Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.

semi-shrink-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 shrinkable.

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 752),
font-interface (page 764), grob-interface (page 770), item-interface (page 779),
pure-from-neighbor-interface (page 800), and time-signature-interface (page 829).

This object is of class Item (characterized by item-interface (page 779)).

3.1.148 TrillPitchAccidental
The accidental of a pitched trill. See also TrillPitchGroup (page 721).

TrillPitchAccidental objects are created by the following engraver(s):
Pitched_trill_engraver (page 487).

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 or clefs, `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.

Note that many objects have special positioning considerations, which cause any setting of `X-offset` to be ignored or modified, even though the object supports the `self-alignment-interface` (page 803).

`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 739), `accidental-switch-interface` (page 741), `font-interface` (page 764), `grob-interface` (page 770), `inline-accidental-interface` (page 777), `item-interface` (page 779), `side-position-interface` (page 806), and `trill-pitch-accidental-interface` (page 829).

This object is of class Item (characterized by `item-interface` (page 779)).

### 3.1.149 TrillPitchGroup

An auxiliary grob to construct a pitched trill, aligning TrillPitchAccidental (page 720), TrillPitchParentheses (page 723), and TrillPitchHead (page 723), horizontally. See also TrillSpanner (page 724).
TrillPitchGroup objects are created by the following engraver(s):
Pitched_trill_engraver (page 487).

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.
  - Note that many objects have special positioning considerations, which cause any setting of X-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

- **Y-extent** (pair of numbers):
  - `#<unpure-pure-container #<procedure ly:axis-group-interface::height (_)> #<procedure trill-pitch-group::pure-height (grob start end)>>`
  - Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): axis-group-interface (page 743), grob-interface (page 770), item-interface (page 779), and side-position-interface (page 806).

This object is of class Item (characterized by item-interface (page 779)).
3.1.150 TrillPitchHead

The note head of a pitched trill. See also TrillPitchGroup (page 721).

TrillPitchHead objects are created by the following engraver(s):
Pitched_trill_engraver (page 487).

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.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): accidental-participating-head-interface
(page 740), font-interface (page 764), grob-interface (page 770), item-interface
(page 779), ledgered-interface (page 783), note-head-interface (page 794),
pitched-trill-interface (page 800), and staff-symbol-referencer-interface
(page 817).

This object is of class Item (characterized by item-interface (page 779)).

3.1.151 TrillPitchParentheses

The parentheses of a pitched trill. See also TrillPitchGroup (page 721).

TrillPitchParentheses objects are created by the following engraver(s):
Pitched_trill_engraver (page 487).
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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 font-size 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 764),
grob-interface (page 770), item-interface (page 779), parentheses-interface (page 798), and pitched-trill-interface (page 800).

This object is of class Item (characterized by item-interface (page 779)).

3.1.152 TrillSpanner

A continued trill with a wiggly line (created with \startTrillSpan, not with \trill). See also TrillPitchGroup (page 721).

TrillSpanner objects are created by the following engraver(s): Trill_spanner_engraver (page 499).

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 (layout props axis arg)> 0
    (#<procedure musicglyph-markup (layout props glyph-name)> "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.

inght-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 764), grob-interface (page 770), horizontal-line-spanner-interface (page 776), line-interface (page 783), outside-staff-interface (page 797), side-position-interface (page 806), spanner-interface (page 814), and trill-spanner-interface (page 829).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.153 TupletBracket
A tuplet bracket. See also TupletNumber (page 727).

TupletBracket objects are created by the following engraver(s): Tuplet_engraver (page 500).
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:spanner::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.

max-slope-factor (non-negative number):
  0.5
  Factor for calculating the maximum tuplet bracket slope. Notice that there exists a homonymous property for slurs.

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.

span-all-note-heads (boolean):
  #f
  If true, tuplet brackets are printed spanning horizontally from the first to the last note head instead of covering only the stems.

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 770),
line-interface (page 783), outside-staff-interface (page 797), spanner-interface
(page 814), and tuplet-bracket-interface (page 830).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.154 TupletNumber
A tuplet number. See also TupletBracket (page 725).

TupletNumber objects are created by the following engraver(s): Tuplet_engraver
(page 500).

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. Possible values are upright, italic, oblique, and
  slanted (which is the same as oblique).

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.
  Note that many objects have special positioning considerations, which cause any
  setting of X-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

Y-offset (number):
  ly:tuplet-number::calc-y-offset
  The vertical amount that this object is moved relative to its Y-parent.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): font-interface (page 764),
grob-interface (page 770), outside-staff-interface (page 797), spanner-interface
(page 814), text-interface (page 824), and tuplet-number-interface (page 832).
This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.155 UnaCordaPedal
An una corda pedal mark. See also UnaCordaPedalLineSpanner (page 730), SostenutoPedal
(page 682), SustainPedal (page 700), and PianoPedalBracket (page 663).
UnaCordaPedal objects are created by the following engraver(s): Piano_pedal_engraver (page 486).

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. Possible values are upright, italic, oblique, and slanted (which is the same as oblique).

**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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

**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. Note that many objects have special positioning considerations, which cause any setting of `X-offset` to be ignored or modified, even though the object supports the `self-alignment-interface` (page 803).
Y-extent (pair of numbers):

\texttt{#<unpure-pure-container \#<procedure \texttt{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 764), grob-interface (page 770), item-interface (page 779), piano-pedal-script-interface (page 800), self-alignment-interface (page 803), and text-interface (page 824).

This object is of class Item (characterized by item-interface (page 779)).

3.1.156 \texttt{UnaCordaPedallLineSpanner}

An auxiliary grob providing a baseline to align consecutive UnaCordaPedal (page 728), grobs vertically.

UnaCordaPedallLineSpanner objects are created by the following engraver(s):
\texttt{Piano_pedal_align_engraver} (page 486).

Standard settings:

axes (list):

\texttt{'(1)}

List of axis numbers. In the case of alignment grobs, this should contain only one number.

direction (direction):

\texttt{-1}

If \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: \texttt{UP=1}, \texttt{DOWN=-1}, \texttt{LEFT=-1}, \texttt{RIGHT=1}, \texttt{CENTER=0}.

minimum-space (dimension, in staff space):

\texttt{1.0}

Minimum distance that the victim should move (after padding).

outside-staff-priority (number):

\texttt{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):

\texttt{1.2}

Add this much extra space between objects that are next to each other.

side-axis (number):

\texttt{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):

\texttt{1.2}

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics \texttt{p} and \texttt{f}) on their baselines.
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.

Note that many objects have special positioning considerations, which cause any
setting of Y-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).

This object supports the following interface(s): axis-group-interface (page 743),
grob-interface (page 770), outside-staff-interface (page 797), piano-pedal-interface
(page 800), side-position-interface (page 806), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.157 VaticanaLigature
A grob to display a melisma (ligature) as used in Gregorian chant. See also KievanLigature
(page 622), MensuralLigature (page 640), and LigatureBracket (page 627).

VaticanaLigature objects are created by the following engraver(s):
Vaticana_ligature_engraver (page 500).

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 764), grob-interface (page 770), spanner-interface (page 814), and
vaticana-ligature-interface (page 832).

This object is of class Spanner (characterized by spanner-interface (page 814)).
### 3.1.158 VerticalAlignment

A top-level auxiliary grob to stack groups (staves, lyrics lines, etc.). See also StaffGrouper (page 689), and VerticalAxisGroup (page 732).

VerticalAlignment objects are created by the following engraver(s):
Vertical_align_engraver (page 500).

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 741), axis-group-interface (page 743), grob-interface (page 770), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.159 VerticalAxisGroup

An auxiliary grob to group everything contained in a context like Staff (page 305), Lyrics (page 216), Dynamics (page 129), etc. See also StaffGrouper (page 689), and VerticalAlignment (page 732).

VerticalAxisGroup objects are created by the following engraver(s):
Axis_group_engraver (page 447).

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):

```lisp
#<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):**

```latex
ly:hara-kiri-group-spanner::calc-skylines
```

Two skylines, one above and one below this grob.

**X-extent (pair of numbers):**

```latex
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):**

```latex
#<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):**

```latex
ly:hara-kiri-group-spanner::force-hara-kiri-callback
```

The vertical amount that this object is moved relative to its Y-parent.

Note that many objects have special positioning considerations, which cause any setting of **Y-offset** to be ignored or modified, even though the object supports the **self-alignment-interface** (page 803).

This object supports the following interface(s): **axis-group-interface** (page 743), **grob-interface** (page 770), **hara-kiri-group-spanner-interface** (page 775), **outside-staff-axis-group-interface** (page 796), and **spanner-interface** (page 814).

This object is of class **Spanner** (characterized by **spanner-interface** (page 814)).

### 3.1.160 VoiceFollower

A line to indicate staff changes of a voice.

VoiceFollower objects are created by the following engraver(s):

**Note_head_line_engraver** (page 482).

**Standard settings:**

```latex
after-line-breaking (boolean):
ly:spanner::kill-zero-spanned-time
```

Dummy property, used to trigger callback for **after-line-breaking**.

```latex
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):**

```latex
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 770),
line-interface (page 783), line-spanner-interface (page 784), and spanner-interface
(page 814).
This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.161 VoltaBracket
A volta bracket. See also VoltaBracketSpanner (page 736).
VoltaBracket objects are created by the following engraver(s): Volta_engraver
(page 501).

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.

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-size (number):
    3
    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.

range-collapse-threshold (non-negative, exact integer):
    3
If the length of a volta range is greater than or equal to this threshold, print it with a dash. For example, if this is 3, a \volta 1,2,3 is printed as ‘1.-3.’, but if it is 4, it is printed as ‘1.2.3.’.

**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.

**text** *(markup):*

volta-bracket-interface::calc-text

Text markup. See Section “Formatting text” in Notation Reference.

**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.

**volta-number-offset** *(pair of numbers):*

'(1.0 . -0.5)

The offset of the volta number relative to the upper left corner of the volta bracket.

**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 (grob start end)> >

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): font-interface (page 764), grob-interface (page 770), horizontal-bracket-interface (page 775), line-interface (page 783), side-position-interface (page 806), spanner-interface (page 814), text-interface (page 824), volta-bracket-interface (page 833), and volta-interface (page 834).

This object is of class Spanner (characterized by spanner-interface (page 814)).

### 3.1.162 VoltaBracketSpanner

An auxiliary grob providing a baseline to align consecutive VoltaBracket (page 735), grobs vertically.
VoltaBracketSpanner objects are created by the following engraver(s): Volta_engraver (page 501).

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.

Note that many objects have special positioning considerations, which cause any setting of Y-offset to be ignored or modified, even though the object supports the self-alignment-interface (page 803).

This object supports the following interface(s): axis-group-interface (page 743), grob-interface (page 770), outside-staff-interface (page 797), side-position-interface (page 806), spanner-interface (page 814), and volta-interface (page 834).

This object is of class Spanner (characterized by spanner-interface (page 814)).

3.1.163 VowelTransition

A vowel transition in lyrics. See also LyricHyphen (page 629).

VowelTransition objects are created by the following engraver(s): Hyphen_engraver (page 471).

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.
  Note that many objects have special positioning considerations, which cause any
  setting of Y-offset to be ignored or modified, even though the object supports the
  self-alignment-interface (page 803).

This object supports the following interface(s): grob-interface (page 770),
horizontal-line-spanner-interface (page 776), line-interface (page 783),
lyric-interface (page 787), and spanner-interface (page 814).

This object is of class Spanner (characterized by spanner-interface (page 814)).

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 or clefs, 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 520), AccidentalCautionary (page 521), AccidentalSuggestion (page 523), AmbitusAccidental (page 527), and TrillPitchAccidental (page 720).

3.2.2 accidental-participating-head-interface
A grob that should set the current alteration for a pitch in a measure.

This grob interface is used in the following graphical object(s): NoteHead (page 652), and TrillPitchHead (page 723).

3.2.3 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 522).

3.2.4 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 523).
3.2.5 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 520), AccidentalCautionary (page 521), AccidentalSuggestion (page 523), AmbitusAccidental (page 527), BalloonText (page 531), BassFigure (page 538), ChordName (page 556), CombineTextScript (page 566), GridChordName (page 605), HorizontalBracketText (page 610), InstrumentName (page 612), InstrumentSwitch (page 613), KeyCancellation (page 616), KeySignature (page 619), MeasureSpanner (page 638), NoteName (page 653), RehearsalMark (page 664), TextMark (page 710), TextScript (page 712), and TrillPitchAccidental (page 720).

3.2.6 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 “NonMusicalPaperColumn” 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 538), and VerticalAlignment (page 732).

3.2.7 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 \texttt{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): \texttt{Ambitus} (page 525), \texttt{AmbitusLine} (page 527), and \texttt{AmbitusNoteHead} (page 528).

### 3.2.8 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 \texttt{t} value, an ending \texttt{t} value, a \texttt{dash-fraction}, and a \texttt{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 \texttt{Staff.StaffSymbol.thickness}).

- **positions** (pair of numbers)
  Pair of staff coordinates \((\texttt{start} \ , \ \texttt{end})\), where \texttt{start} and \texttt{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 \texttt{Staff.StaffSymbol.thickness}).
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 529).

3.2.9 **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 other 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 525), BassFigureAlignment (page 538), BassFigureAlignmentPositioning (page 539), BassFigureLine (page 541), BreakAlignGroup (page 548), BreakAlignment (page 549), CenteredBarNumberLineSpanner (page 555), DotColumn (page 581), DynamicLineSpanner (page 589), NonMusicalPaperColumn (page 649), NoteCollision (page 650), NoteColumn (page 651), PaperColumn (page 656), SostenutoPedalLineSpanner (page 683),
3.2.10 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 531), and Footnote (page 600).

3.2.11 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.

Full-height bar lines are normally squared to meet the outer staff lines, but their ends may be rounded by setting the rounded property. The ends of short and tick bars are always rounded.
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 or clefs, 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).

right-justified (boolean)
Used for BarLines to right-align them. Usually the extent of a BarLine has some positive value to the right. If this property is set to #t, BarLine.stencil is translated to the left by this value. Needs to be set at Score or StaffGroup level. As a result all BarLines of said Score or StaffGroup are right-justified.

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).

short-bar-extent (pair of numbers)
The Y-extent of a short bar line. The default is half the normal bar extent, rounded up to an integer number of staff spaces.
thick-thickness (number)
Thick 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 532), and SpanBar (page 685).

3.2.12 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 536), CenteredBarNumber (page 554), and CenteredBarNumberLineSpanner (page 555).

3.2.13 bass-figure-alignment-interface
Align a bass figure.
This grob interface is used in the following graphical object(s): BassFigureAlignment (page 538).

3.2.14 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 538).

3.2.15 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.

beam-eps
Epsilon for beam quant code to check for presence in gap.
collision-padding
Padding value to avoid vertical collision with other objects.
collision-penalty
Demerit penalty for collision-padding.
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 \(<=\) round-to-zero-slope.
ideal-slope-factor
Demerit scaling factor for difference between beam slope and damping slope.

musical-direction-factor
Demerit scaling factor for difference between beam slope and music slope.

region-size
Size of region for checking quant scores.

round-to-zero-slope
Damping slope which is considered zero for purposes of calculating direction penalties.

secondary-beam-demerit
Demerit used in quanting calculations for multiple beams.

stem-collision-factor
Demerit factor used for colliding stems.

stem-length-demerit-factor
Demerit factor used for inappropriate stem lengths.

stem-length-limit-penalty
Penalty for differences in stem lengths on a beam.

User-settable properties:

accidental-padding (number)
Property used by Beam to avoid accidentals in whole note tremolos.

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)
A pair of numbers specifying how much a broken spanner sticks out of its bounds horizontally on the broken side(s). For broken beams and broken tuplet brackets, the bounds are given by the prefatory matter on the left and/or the rightmost column on the right. For broken horizontal brackets, the bounds are the leftmost and/or rightmost column; for broken measure spanners, the left and/or right edge of the staff.

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)
An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

direction (direction)
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

gap (dimension, in staff space)
Size of a gap in a variable symbol.

gap-count (integer)
Number of gapped beams for tremolo.

grow-direction (direction)
Crescendo or decrescendo?

inspect-quants (pair of numbers)
If debugging is set, set beam and slur position to a (quantized) position that is as close as possible to this value, and print the demerits for the inspected position in the output.

knee (boolean)
Is this beam kneed?

length-fraction (number)
Multiplier for lengths. Used for determining ledger lines and stem lengths.

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.

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 542).

### 3.2.16 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 545).

### 3.2.17 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.

- **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.
bend-arrowhead-height
   The height of the arrow head.

bend-arrowhead-width
   The width of the arrow head.

curvature-factor
   Determines the horizontal part of a bent arrow as percentage of the total horizontal extent, usually between 0 and 1.

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.

vertical-padding
   Vertical padding between note heads and bends for pre-bend and pre-bend-hold styles.

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)
   An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob's details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

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 546),
NoteColumn (page 651), NoteHead (page 652), and TabNoteHead (page 707).

3.2.18 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 #t 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 623), PhrasingSlur (page 661), RepeatTie (page 667), Slur (page 680), and Tie
(page 715).

3.2.19 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 536),
CodaMark (page 564), JumpScript (page 614), LyricRepeatCount (page 631), MetronomeMark
(page 640), RehearsalMark (page 664), SectionLabel (page 672), SegnoMark (page 674), and
TextMark (page 710).

3.2.20 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)

If space-alist is defined for a grob that gets spaced in a staff, an entry for first-note must be present. If there is no next-note entry, the value of first-note is used instead.

Choices for spacing-style are:

extra-space
Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.

shrink-space
Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.
semi-shrink-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 shrinkable.

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 525), AmbitusAccidental (page 527), BarLine (page 532), BreakAlignGroup (page 548), BreathingSign (page 550), Clef (page 558), CueClef (page 571), CueEndClef (page 574), Custos (page 576), Divisio (page 578), DoublePercentRepeat (page 583), KeyCancellation (page 616), KeySignature (page 619), LeftEdge (page 625), SignumRepetitionis (page 676), SpanBar (page 685), StaffEllipsis (page 687), and TimeSignature (page 718).

3.2.21 break-alignment-interface
The object that performs break alignment.

Three interfaces deal specifically with break alignment:
1. break-alignment-interface (this one),
2. Section 3.2.19 [break-alignable-interface], page 752, and
3. Section 3.2.20 [break-aligned-interface], page 752.

Each of these interfaces supports grob properties that use break-align symbols, which are Scheme symbols 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:
```scheme
\override Score.BreakAlignment.break-align-orders =
#(make-vector 3 '(left-edge
cue-end-clef
ambitus
breathing-sign
```
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 549).

3.2.22 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 550),
   and Divisio (page 578).

3.2.23 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 553).

3.2.24 centered-bar-number-interface

A measure-centered bar number.

This grob interface is used in the following graphical object(s): CenteredBarNumber
   (page 554).

3.2.25 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 555).

3.2.26 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. If not a number, align on the object’s reference point.

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 554), MeasureCounter (page 635), and PercentRepeat (page 658).

3.2.27 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 556), and FretBoard (page 601).

3.2.28 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 557).
3.2.29 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 or clefs, 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 558), CueClef (page 571), and CueEndClef (page 574).

3.2.30 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 561).

3.2.31 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 564).

3.2.32 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 563).

3.2.33 **coda-mark-interface**

A coda sign.

This grob interface is used in the following graphical object(s): CodaMark (page 564).

3.2.34 **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 568).

3.2.35 **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 569).
3.2.36 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 576).

3.2.37 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 581).

3.2.38 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 or clefs, 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 582).

### 3.2.39 duration-line-interface

A line lasting for the duration of a rhythmic event.

- **details** (alist, with symbols as keys)

  An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob's details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob's description section.

This grob interface is used in the following graphical object(s): DurationLine (page 587).
3.2.40 dynamic-interface
Any kind of loudness sign.

This grob interface is used in the following graphical object(s): DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner (page 592), and Hairpin (page 607).

3.2.41 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 589).

3.2.42 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 590).

3.2.43 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 592).

3.2.44 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 \texttt{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 540).

3.2.45 episema-interface
An episema line.

This grob interface is used in the following graphical object(s): Episema (page 594).

3.2.46 figured-bass-continuation-interface
Simple extender line between bounds.

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 541).

3.2.47 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.

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)
An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob's details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob's description section.

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 595).

3.2.48 finger-interface
A fingering instruction.

3.2.49 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 599).

3.2.50 flag-interface
A flag that gets attached to a stem. The style property is a symbol determining what style of flag glyph is typeset on a Stem grob. Valid options include '(') (for standard flags), 'mensural, 'stacked, 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 or clefs, 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 599).

3.2.51 font-interface
Any symbol that is typeset through fixed sets of glyphs, (i.e., fonts).

User-settable properties:

count (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).

count-families (symbol)
The font family is the broadest category for selecting text fonts. Options include serif, sans and typewriter.

count-features (list)
Opentype features.

count-name (string)
This property is kept for backwards compatibility only. Use the fonts property instead.
font-series (symbol)
Select the series of a font. Common choices are normal and bold. The full list of symbols that can be used is: thin, ultralight, light, semilight, book, normal, medium, semibold, bold, ultrabold, heavy, ultraheavy.

font-shape (symbol)
Select the shape of a font. Possible values are upright, oblique, and slanted (which is the same as oblique).

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.

font-stretch (symbol)
Select a condensed or expanded font, if available in the font family. Possible values are ultra-condensed, extra-condensed, condensed, semi-condensed, normal, semi-expanded, expanded, extra-expanded, and ultra-expanded.

font-variant (symbol)
Select the variant of a font. Choices include normal and small-caps.

fonts (alist, with symbols as keys)
An alist mapping font families to font names. The standard font families are music, serif, sans and typewriter.

Internal properties:

font (font metric)
A cached font metric object.

This grob interface is used in the following graphical object(s): Accidental (page 520), AccidentalCautionary (page 521), AccidentalSuggestion (page 523), AmbitusAccidental (page 527), AmbitusLine (page 527), AmbitusNoteHead (page 528), Arpeggio (page 529), BalloonText (page 531), BarLine (page 532), BarNumber (page 536), BassFigure (page 538), BendSpanner (page 546), BreathingSign (page 550), CaesuraScript (page 553), CenteredBarNumber (page 554), ChordName (page 556), Clef (page 558), ClefModifier (page 561), CodaMark (page 564), CombineTextScript (page 566), CueClef (page 571), CueEndClef (page 574), Custos (page 578), Divisio (page 578), Dots (page 582), DoublePercentRepeat (page 583), DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DurationLine (page 587), DynamicText (page 590), DynamicTextSpanner (page 592), Episema (page 594), FingerGlideSpanner (page 595), Fingering (page 597), Flag (page 599), Footnote (page 600), FretBoard (page 601), Glissando (page 603), GridChordName (page 605), HorizontalBracketText (page 610), InstrumentName (page 612), InstrumentSwitch (page 613), JumpScript (page 614), KeyCancellation (page 616), KeySignature (page 619), KievanLigature (page 622), LyricHyphen (page 629), LyricRepeatCount (page 631), LyricText (page 633), MeasureCounter (page 635), MeasureSpanner (page 638), MensuralLigature (page 640), MetronomeMark (page 640), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), NonMusicalPaperColumn (page 649), NoteHead (page 652), NoteName (page 653), OttavaBracket (page 655), PaperColumn (page 656), Parentheses (page 657), PercentRepeat (page 658), PercentRepeatCounter (page 660), RehearsalMark (page 664), Rest (page 669), Script (page 670), SectionLabel (page 672), SegnoMark (page 674), SignumRepetitionis (page 676), SostenutoPedal (page 682), SpanBar
3.2.52 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 600).

3.2.53 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 thickness * (1+string-thickness-factor) ^ (k-1). Default 0.
• **top-fret-thickness** – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.
• **xo-font-magnification** – Magnification used for mute and open string indicators. Default value 0.5.
• xo-padding – Padding for open and mute indicators from top fret. Default value 0.25.

size (number)
The ratio of the size of the object to its default size.

thickness (number)
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to Staff.StaffSymbol.thickness).

This grob interface is used in the following graphical object(s): FretBoard (page 601).

3.2.54 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 603).

3.2.55 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 605).

3.2.56 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.
demunum (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?

stropha (boolean)
   Is this neume a stropha?

virga (boolean)
   Is this neume a virga?

This grob interface is used in the following graphical object(s): NoteHead (page 652).

3.2.57 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 605).

3.2.58 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 606).
3.2.59 grid-point-interface

A spanning point for grid lines.

This grob interface is used in the following graphical object(s): GridPoint (page 607).

3.2.60 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 650, object is also an abstract grob: It only moves around chords, but doesn’t print anything.

Grobs have properties (Scheme variables) that can be read and set. Two types of them exist: immutable and mutable. Immutable variables define the default style and behavior. They are shared between many objects. They can be changed using \override and \revert. Mutable properties are variables that are specific to one grob. Typically, lists of other objects, or results from computations are stored in mutable properties. In particular, every call to ly:grob-set-property! (or its C++ equivalent) sets a mutable property.

The properties after-line-breaking and before-line-breaking are dummies that are not user-serviceable.

User-settable properties:

- **after-line-breaking** (boolean)
  Dummy property, used to trigger callback for after-line-breaking.

- **avoid-slur** (symbol)
  Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

- **before-line-breaking** (boolean)
  Dummy property, used to trigger a callback function.

- **color** (color)
  The color of this grob.

- **extra-offset** (pair of numbers)
  A pair representing an offset. This offset is added just before outputting the symbol, so the typesetting engine is completely oblivious to it. The values are measured in staff-space units of the staff’s StaffSymbol.

- **footnote-music** (music)
  Music creating a footnote.

- **forced-spacing** (number)
  Spacing forced between grobs, used in various ligature engravers.
horizontal-skylines (pair of skylines)
  Two skylines, one to the left and one to the right of this grob.

id (string)
  An id string for the grob.

layer (integer)
  An integer which determines the order of printing objects. Objects with the lowest
  value of layer are drawn first, then objects with progressively higher values are drawn,
  so objects with higher values overwrite objects with lower values. By default most
  objects are assigned a layer value of 1.

minimum-X-extent (pair of numbers)
  Minimum size of an object in X dimension, measured in 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 underly-
ing 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.

Note that many objects have special positioning considerations, which cause any
setting of X-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).

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.

Note that many objects have special positioning considerations, which cause any
setting of Y-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).

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 mea-
sured relative to the grobs’s parent staff (more generally, its VerticalAxisGroup)
so this boolean flags grobs that are not rigidly fixed to their parent staff. Beams
that join notes from two staves are cross-staff. Grobs that are positioned around
such beams are also cross-staff. Grobs that are grouping objects, however, like
VerticalAxisGroups will not in general be marked cross-staff when some of the
members of the group are cross-staff.

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 520), AccidentalCautionary (page 521), AccidentalPlacement (page 522),
AccidentalSuggestion (page 523), Ambitus (page 525), AmbitusAccidental (page 527),
AmbitusLine (page 527), AmbitusNoteHead (page 528), Arpeggio (page 529), BalloonText
(page 531), BarLine (page 532), BarNumber (page 536), BassFigure (page 538),
BassFigureAlignment (page 538), BassFigureAlignmentPositioning (page 539),
BassFigureBracket (page 540), BassFigureContinuation (page 541), BassFigureLine
(page 541), Beam (page 542), BendAfter (page 545), BendSpanner (page 546),
BreakAlignGroup (page 548), BreakAlignment (page 549), BreathingSign (page 550),
CaesuraScript (page 553), CenteredBarNumber (page 554), CenteredBarNumberLineSpanner
(page 555), ChordName (page 556), ChordSquare (page 557), Clef (page 558), ClefModifier
(page 561), ClusterSpanner (page 563), ClusterSpannerBeacon (page 564), CodaMark
(page 564), CombineTextScript (page 566), ControlPoint (page 568), ControlPolygon
(page 569), CueClef (page 571), CueEndClef (page 574), Custos (page 576), Divisio
(page 578), DotColumn (page 581), Dots (page 582), DoublePercentRepeat (page 583),
DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DurationLine
(page 587), DynamicLineSpanner (page 589), DynamicText (page 590), DynamicTextSpanner
(page 592), Episema (page 594), Finger GlideSpanner (page 595), Fingering (page 597),
FingeringColumn (page 599), Flag (page 599), Footnote (page 600), FretBoard (page 601),
Glissando (page 603), GraceSpacing (page 605), GridChordName (page 605), GridLine
(page 606), GridPoint (page 607), Hairpin (page 607), HorizontalBracket (page 609),
HorizontalBracketText (page 610), InstrumentName (page 612), InstrumentSwitch
(page 613), JumpScript (page 614), KeyCancellation (page 616), KeySignature (page 619),
KievanLigature (page 622), LaissezVibrerTie (page 623), LaissezVibrerTieColumn
(page 624), LedgerLineSpanner (page 624), LeftEdge (page 625), LigatureBracket
(page 627), LyricExtender (page 629), LyricHyphen (page 629), LyricRepeatCount
(page 631), LyricSpace (page 633), LyricText (page 633), MeasureCounter (page 635),
MeasureGrouping (page 637), MeasureSpanner (page 638), MelodyItem (page 639),
MensuralLigature (page 640), MetronomeMark (page 640), MultiMeasureRest
(page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646),
MultiMeasureRestText (page 647), NonMusicalPaperColumn (page 649), NoteCollision
(page 650), NoteColumn (page 651), NoteHead (page 652), NoteName (page 653), NoteSpacing
(page 654), OttavaBracket (page 655), PaperColumn (page 656), Parentheses (page 657),
PercentRepeat (page 658), PercentRepeatCounter (page 660), PhrasingSlur (page 661),
PianoPedalBracket (page 663), RehearsalMark (page 664), RepeatSlash (page 666),
RepeatTie (page 667), RepeatTieColumn (page 668), Rest (page 669), RestCollision
3.2.61 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 607).
3.2.62 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 732).

3.2.63 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.

- break-overshoot (pair of numbers)
  A pair of numbers specifying how much a broken spanner sticks out of its bounds horizontally on the broken side(s). For broken beams and broken tuplet brackets, the bounds are given by the prefatory matter on the left and/or the rightmost column on the right. For broken horizontal brackets, the bounds are the leftmost and/or rightmost column; for broken measure spanners, the left and/or right edge of the staff.
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.

dashed-edge
   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 609),
      OttavaBracket (page 655), and VoltaBracket (page 735).

3.2.64 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 610).

3.2.65 horizontal-line-spanner-interface
This interface is a subset of the Section 3.2.79 [line-spanner-interface], page 784, for use
   with line spanners that are always horizontal (such as crescendo spanners). The details.
   subproperty is irrelevant. Grobs having this interface can be side-positioned vertically.

User-settable properties:
   bound-details (alist, with symbols as keys)
      An alist of properties for determining attachments of spanners to edges.

   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.
Chapter 3: Backend

3.2.66 inline-accidental-interface
An inlined accidental (i.e., normal accidentals, cautionary accidentals).

3.2.67 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 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 712).

3.2.68 item-interface
Grobs can be distinguished in their role in the horizontal spacing. Many grobs define constraints
on the spacing by their sizes, for example, note heads, clefs, stems, and all other symbols with
a fixed shape. These grobs form a subtype called Item.

Some items need special treatment for line breaking. For example, a clef is normally only
printed at the start of a line (i.e., after a line break). To model this, ‘breakable’ items (clef, key
signature, bar lines, etc.) are copied twice. Then we have three versions of each breakable item:
one version if there is no line break, one version that is printed before the line break (at the end
of a system), and one version that is printed after the line break.

Whether these versions are visible and take up space is determined by the outcome of the
break-visibility grob property, which is a function taking a direction (-1, 0 or 1) as an
argument. It returns a cons of booleans, signifying whether this grob should be transparent and
have no extent.

The following variables for break-visibility are predefined:

<table>
<thead>
<tr>
<th>grob will show:</th>
<th>before</th>
<th>no</th>
<th>after</th>
</tr>
</thead>
<tbody>
<tr>
<td>break</td>
<td>break</td>
<td>break</td>
<td></td>
</tr>
<tr>
<td>all-invisible</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>
User-settable properties:

- **break-visibility** (vector)
  A vector of 3 booleans, 
  
  `#(end-of-line unbroken begin-of-line)
  #t` means visible, `#f` means killed.

- **extra-spacing-height** (pair of numbers)
  In the horizontal spacing problem, we increase the height of each item by this amount
  (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of
  the item). In order to make a grob infinitely high (to prevent the horizontal spacing
  problem from placing any other grobs above or below this grob), set this to `(-inf.0 .
  +inf.0)`.

- **extra-spacing-width** (pair of numbers)
  In the horizontal spacing problem, we pad each item by this amount (by adding the
  ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item).
  In order to make a grob take up no horizontal space at all, set this to `(+inf.0 .
  -inf.0)`.

- **non-musical** (boolean)
  True if the grob belongs to a `NonMusicalPaperColumn`.

This grob interface is used in the following graphical object(s): Accidental (page 520),
AccidentalCautionary (page 521), AccidentalPlacement (page 522),
AccidentalSuggestion (page 523), Ambitus (page 525), AmbitusAccidental (page 527),
AmbitusLine (page 527), AmbitusNoteHead (page 528), Arpeggio (page 529), BarLine
(page 532), BarNumber (page 536), BassFigure (page 538), BassFigureBracket (page 540),
BreakAlignGroup (page 548), BreakAlignment (page 549), BreathingSign (page 550),
CaesuraScript (page 553), ChordName (page 556), Clef (page 558), ClefModifier
(page 561), ClusterSpannerBeacon (page 564), CodaMark (page 564), CombineTextScript
(page 566), CueClef (page 571), CueEndClef (page 574), Custos (page 576), Divisio
(page 578), DotColumn (page 581), Dots (page 582), DoublePercentRepeat (page 583),
DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DynamicText
(page 590), Fingering (page 597), FingerprintColumn (page 599), Flag (page 599),
FretBoard (page 601), GridLine (page 606), GridPoint (page 607), InstrumentSwitch
(page 613), JumpScript (page 614), KeyCancellation (page 616), KeySignature
(page 619), LaissezVibrerTie (page 623), LaissezVibrerTieColumn (page 624), LeftEdge
(page 625), LyricRepeatCount (page 631), LyricText (page 633), MelodyItem (page 639),
MetronomeMark (page 640), NonMusicalPaperColumn (page 649), NoteCollision (page 650),
NoteColumn (page 651), NoteHead (page 652), NoteName (page 653), NoteSpacing (page 654),
PaperColumn (page 656), RehearsalMark (page 664), RepeatSlash (page 666), RepeatTie
(page 667), RepeatTieColumn (page 668), Rest (page 669), RestCollision (page 670),
Script (page 670), ScriptColumn (page 672), ScriptRow (page 672), SectionLabel
(page 672), SegnoMark (page 674), SignumRepetitionis (page 676), SostenutoPedal
(page 682), SpanBar (page 685), SpanBarStub (page 686), StaffEllipsis (page 687),
StaffSpacing (page 691), StanzaNumber (page 692), Stem (page 693), StemStub (page 695),
StemTremolo (page 696), StringNumber (page 697), StrokeFinger (page 699), SustainPedal
(page 700), TabNoteHead (page 707), TextMark (page 710), TextScript (page 712),
TimeSignature (page 718), TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillPitchHead (page 723), TrillPitchParentheses (page 723), and UnaCordaPedal (page 728).

In addition, this interface is supported conditionally by the following objects depending on their class: BalloonText (page 531), ControlPoint (page 568), ControlPolygon (page 569), Footnote (page 600), and Parentheses (page 657).

3.2.69 jump-script-interface
A jump instruction, e.g., D.S.

This grob interface is used in the following graphical object(s): JumpScript (page 614).

3.2.70 key-cancellation-interface
A key cancellation.

This grob interface is used in the following graphical object(s): KeyCancellation (page 616).

3.2.71 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 list 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 616), and KeySignature (page 619).

3.2.72 kievan-ligature-interface
A kievan ligature.

User-settable properties:

    padding (dimension, in staff space)
        Add this much extra space between objects that are next to each other.

Internal properties:

    primitive (integer)
        A pointer to a ligature primitive, i.e., an item similar to a note head that is part of a
        ligature.

    This grob interface is used in the following graphical object(s): KievanLigature
    (page 622).

3.2.73 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 691, 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 624).
3.2.74 ledgered-interface

Objects that need ledger lines, typically note heads. See also Section 3.2.73 [ledger-line-spanner-interface], page 782.

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 528), NoteHead (page 652), and TrillPitchHead (page 723).

3.2.75 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.

3.2.76 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 652).

3.2.77 ligature-interface

A ligature.

This grob interface is not used in any graphical object.

3.2.78 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 \texttt{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 557),
DurationLine (page 587), DynamicTextSpanner (page 592), Episema (page 594), Glissando
(page 603), Hairpin (page 607), HorizontalBracket (page 609), LigatureBracket
(page 627), MeasureSpanner (page 638), OttavaBracket (page 655), PianoPedalBracket
(page 663), TextSpanner (page 714), TrillSpanner (page 724), TupletBracket (page 725),
VoiceFollower (page 734), VoltaBracket (page 735), and VowelTransition (page 738).

3.2.79 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 3.2.65
[horizontal-line-spanner-interface], page 776.

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 546), FingerGlideSpanner (page 595), Glissando (page 603), and VoiceFollower (page 734).

3.2.80 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 629).

3.2.81 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 629), and LyricSpace (page 633).

3.2.82 lyric-interface

Any object that is related to lyrics.

This grob interface is used in the following graphical object(s): LyricExtender (page 629), LyricHyphen (page 629), LyricRepeatCount (page 631), and VowelTransition (page 738).

3.2.83 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 631).

3.2.84 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 633).

3.2.85 lyric-syllable-interface

A single piece of lyrics.

This grob interface is used in the following graphical object(s): LyricText (page 633).

3.2.86 mark-interface

A rehearsal mark, segno, or coda sign.

This grob interface is used in the following graphical object(s): CodaMark (page 564), RehearsalMark (page 664), SegnoMark (page 674), and TextMark (page 710).

3.2.87 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 635).

3.2.88 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 637).

3.2.89 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 #f 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)
      A pair of numbers specifying how much a broken spanner sticks out of its bounds horizontally on the broken side(s). For broken beams and broken tuplet brackets, the bounds are given by the prefatory matter on the left and/or the rightmost column on the right. For broken horizontal brackets, the bounds are the leftmost and/or rightmost column; for broken measure spanners, the left and/or right edge of the staff.

   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 638).

3.2.90 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 639).

3.2.91 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.

-left-down-stem (boolean)
  request a downward left stem for an initial breve in a ligature.

-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.

-right-down-stem (boolean)
  request a downward right stem for a maxima in a ligature.

-right-up-stem (boolean)
  request an upward right stem for a final longa or maxima in a ligature.

This grob interface is used in the following graphical object(s): MensuralLigature (page 640), and NoteHead (page 652).

3.2.92 metronome-mark-interface
A metronome mark.

This grob interface is used in the following graphical object(s): MetronomeMark (page 640).

3.2.93 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 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), and MultiMeasureRestText (page 647).
3.2.94 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 642), and PercentRepeat (page 658).

3.2.95 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 644).

3.2.96 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 656).

3.2.97 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 549), in a NonMusicalPaperColumn (page 649).

This grob interface is used in the following graphical object(s): NonMusicalPaperColumn (page 649).

3.2.98 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 3.2.99 [note-column-interface], page 794: 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 650).

3.2.99 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 down-stem voice note; if there are no down-stem voices, the width of the first
up-stem voice note is taken instead. 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 651).

3.2.100 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 or clefs, *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 528), NoteHead (page 652), TabNoteHead (page 707), and TrillPitchHead (page 723).

3.2.101 note-name-interface

Note names.

This grob interface is used in the following graphical object(s): NoteName (page 653).

3.2.102 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 654).

3.2.103 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 697).

3.2.104 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 655).

3.2.105 outside-staff-axis-group-interface
A vertical axis group on which outside-staff skyline calculations are done.
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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 541), System (page 703), and VerticalAxisGroup (page 732).

3.2.106 outside-staff-interface
A grob that could be placed outside staff.

User-settable properties:

outside-staff-horizontal-padding (number)
By default, an outside-staff-object can be placed so that it is very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

outside-staff-padding (number)
The padding to place between grobs when spacing 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 523), BarNumber (page 536), BassFigureAlignmentPositioning (page 539), BendSpanner (page 546), BreathingSign (page 550), CaesuraScript (page 553), CenteredBarNumberLineSpanner (page 555), ChordName (page 556), ClefModifier (page 561), CodaMark (page 564), CombineTextScript (page 566), Divisio (page 578), DoublePercentRepeatCounter (page 584), DoubleRepeatSlash (page 586), DynamicLineSpanner (page 589), DynamicText (page 590), Fingering (page 597), FretBoard (page 601), Hairpin (page 607), HorizontalBracket (page 609), HorizontalBracketText (page 610), InstrumentSwitch (page 613), JumpScript (page 614), LigatureBracket (page 627), MeasureCounter (page 635), MeasureGrouping (page 637), MeasureSpanner (page 638), MetronomeMark (page 640), MultiMeasureRest (page 642), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), OttavaBracket (page 655), PercentRepeatCounter (page 660), PhrasingSlur (page 661), RehearsalMark (page 664),
3.2.107 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 779).

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.
- **X-alignment-extent** (pair of numbers)
  - If a grob wants to align itself on a PaperColumn grob that doesn’t contain note heads, use this horizontal extent as a placeholder.

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 649), and PaperColumn (page 656).

3.2.108 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 657), and TrillPitchParentheses (page 723).

### 3.2.109 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 583), DoubleRepeatSlash (page 586), PercentRepeat (page 658), and RepeatSlash (page 666).

### 3.2.110 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: \((\text{left-height} \quad \text{right-height})\).

- **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 663).

3.2.111 piano-pedal-interface
A piano pedal sign.

This grob interface is used in the following graphical object(s): PianoPedalBracket (page 663), SostenutoPedalLineSpanner (page 683), SustainPedal (page 700), SustainPedalLineSpanner (page 701), and UnaCordaPedalLineSpanner (page 730).

3.2.112 piano-pedal-script-interface
A piano pedal sign, fixed size.

This grob interface is used in the following graphical object(s): SostenutoPedal (page 682), SustainPedal (page 700), and UnaCordaPedal (page 728).

3.2.113 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 723), and TrillPitchParentheses (page 723).

3.2.114 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 532), Clef (page 558), CueClef (page 571), CueEndClef (page 574), KeyCancellation (page 616), KeySignature (page 619), SignumRepetitionis (page 676), SpanBarStub (page 686), and TimeSignature (page 718).

3.2.115 rehearsal-mark-interface
A rehearsal mark.

This grob interface is used in the following graphical object(s): RehearsalMark (page 664).
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3.2.116 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 670).

3.2.117 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 642), and Rest (page 669).

3.2.118 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 538), ChordName (page 556), ClusterSpannerBeacon (page 564), DoubleRepeatSlash (page 586), FretBoard (page 601), LyricText (page 633), NoteHead (page 652), RepeatSlash (page 666), Rest (page 669), and TabNoteHead (page 707).

3.2.119 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 652), Rest (page 669), and TabNoteHead (page 707).

3.2.120 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 672), and ScriptRow (page 672).

3.2.121 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 523), CaesuraScript (page 553), DynamicText (page 590), MultiMeasureRestScript (page 646), and Script (page 670).

3.2.122 section-label-interface
A section label, e.g., “Coda”.

This grob interface is used in the following graphical object(s): SectionLabel (page 672).

3.2.123 segno-mark-interface
A segno.

This grob interface is used in the following graphical object(s): SegnoMark (page 674).

3.2.124 self-alignment-interface
Position this object on itself and/or on its parent. To this end, the following functions are provided:

ly:self-alignment-interface::x-aligned-on-self
ly:self-alignment-interface::y-aligned-on-self
Align self on reference point, using self-alignment-X and self-alignment-Y, respectively.

ly:self-alignment-interface::aligned-on-x-parent
ty:self-alignment-interface::aligned-on-y-parent
Align reference point of self with the reference point of parent. The position of the own reference point is adjusted with self-alignment-X and self-alignment-Y, the position of the parent’s reference point with parent-alignment-X and parent-alignment-Y, respectively. Function ly:self-alignment-interface::aligned-on-x-parent listens to the property X-alignment-extent of the PaperColumn grob, using it as a fallback width for parent alignment in case the PaperColumn grob does not contain note heads.

ly:self-alignment-interface::centered-on-x-parent
ty:self-alignment-interface::centered-on-y-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 not a number, align on the parent’s reference point. 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. If not a number, align on the object’s reference point.

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 523), BarNumber (page 536), CaesuraScript (page 553), ClefModifier (page 561), CodaMark (page 564), CombineTextScript (page 566), DoublePercentRepeatCounter (page 584), DynamicText (page 590), Fingering (page 597), GridLine (page 606), Hairpin (page 607), HorizontalBracketText (page 610), InstrumentName (page 612), InstrumentSwitch (page 613), JumpScript (page 614), LyricRepeatCount (page 631), LyricText (page 633), MeasureCounter (page 635), MeasureSpanner (page 638), MetronomeMark (page 640), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), NoteName (page 653), PercentRepeatCounter (page 660), RehearsalMark (page 664), Script (page 670), SectionLabel (page 672), SegnoMark (page 674), SostenutoPedal (page 682), StemTremolo (page 696), StringNumber (page 697), StrokeFinger (page 699), SustainPedal (page 700), TextMark (page 710), TextScript (page 712), and UnaCordaPedal (page 728).

3.2.125 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 a desired tie configuration that overrides the default. position is the offset from the center of the staff in half staff-space units, 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.

There is a distinction between exact and inexact values for position: an exact value serves as a rough vertical offset that gets further tuned to make the tie avoid staff lines. An inexact value is taken as the precise vertical offset without further adjustments.
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 624), and RepeatTieColumn (page 668).

### 3.2.126 semi-tie-interface

A tie that 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)
  
  An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

- **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: \( \text{UP} = 1, \text{DOWN} = -1, \text{LEFT} = -1, \text{RIGHT} = 1, \text{CENTER} = 0 \).

- **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 623), and RepeatTie (page 667).

### 3.2.127 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 649), NoteColumn (page 651), and PaperColumn (page 656).

### 3.2.128 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).

minimum-X-space (dimension, in staff space)
Minimum distance that the victim should move horizontally (after padding), overriding the minimum-space property value.

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.

X-padding (dimension, in staff space)
Add this much extra space between objects that are next to each other horizontally, overriding the padding property value.

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 523), Arpeggio (page 529), BarNumber (page 536), BassFigureAlignmentPositioning (page 539), CaesuraScript (page 553), CenteredBarNumberLineSpanner (page 555), ClefModifier (page 561), CodaMark (page 564), CombineTextScript (page 566), DoublePercentRepeatCounter (page 584), DynamicLineSpanner (page 589), Episema (page 594), Fingering (page 597), HorizontalBracket (page 609), HorizontalBracketText (page 610), InstrumentName (page 612), InstrumentSwitch (page 613), JumpScript (page 614), MeasureCounter (page 635), MeasureGrouping (page 637), MeasureSpanner (page 638), MetronomeMark (page 640), MultiMeasureRestNumber (page 644), MultiMeasureRestScript (page 646), MultiMeasureRestText (page 647), OttavaBracket (page 655), PercentRepeatCounter (page 660), RehearsalMark (page 664), Script (page 670), SectionLabel (page 672), SegnoMark (page 674), SostenutoPedalLineSpanner (page 683), StanzaNumber (page 692), StringNumber (page 697), StrokeFinger (page 699), SustainPedalLineSpanner (page 701), SystemStartBar (page 704), SystemStartBrace (page 705), SystemStartBracket (page 706), SystemStartSquare (page 707), TextMark (page 710), TextScript (page 712), TextSpanner (page 714), TrillPitchAccidental (page 720), TrillPitchGroup (page 721), TrillSpanner (page 724), UnaCordaPedalLineSpanner (page 730), VoltaBracket (page 735), and VoltaBracketSpanner (page 736).
3.2.129 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 or clefs, 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).

- **short-bar-extent** (pair of numbers)
  - The Y-extent of a short bar line. The default is half the normal bar extent, rounded up to an integer number of staff spaces.

- **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 676).

3.2.130 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.

absolute-closeness-measure
  Factor to calculate demerit for variance between a note head and slur.

accidental-collision
  Factor to calculate demerit for Accidental objects that the slur encompasses. This property value replaces the value of extra-object-collision-penalty.

close-to-edge-length
  Threshold to decide whether an object to avoid is horizontally close to the slur’s edge. If it is, it doesn’t influence the slur’s height.

ever-attraction-factor
  Factor used to calculate the demerit for distances between slur endpoints and their corresponding base attachments.

ever-slope-exponent
  Factor used to calculate the demerit for the slope of a slur near its endpoints; a larger value yields a larger demerit.

encompass-object-range-overshoot
  Widen the range of encompass-object positions by this amount for computing the slur.

ever-encompass-collision-distance
  This detail is currently unused.

ever-encompass-free-distance
  The amount of vertical free space that must exist between a slur and various objects it encompasses, including accidentals, fingerings, and tuple numbers.

extra-object-collision-penalty
  Factor to calculate demerit for extra objects that the slur encompasses, including accidentals, fingerings, and tuple numbers.

free-head-distance
  The amount of vertical free space that must exist between a slur and note heads.

free-slur-distance
  The amount of vertical free space that must exist between adjacent slurs. This subproperty only works for PhrasingSlur.

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.

head-encompass-penalty
  Demerit to apply when note heads collide with a slur.

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.

max-slope
The maximum slope allowed for this slur.

max-slope-factor
Factor that calculates demerit based on the max slope. Notice that there exists a homonymous property for tuplet brackets.

non-horizontal-penalty
Demerit for slurs with attachment points that are not horizontally aligned.

region-size
Size of region (in staff spaces) for determining potential endpoints in the Y-direction.

same-slope-penalty
Demerit for slurs with attachment points that are horizontally aligned.

slur-tie-extrema-min-distance
If a slur starts or ends very near to or at the same position as a tie, check this threshold whether slur and tie are too close.

slur-tie-extrema-min-distance-penalty
Demerit to apply if slur-tie-extrema-min-distance gets triggered.

steeper-slope-factor
Factor used to calculate demerit only if this slur is not broken.

stem-encompass-penalty
Demerit to apply when stems collide with a slur.

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.

color-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)
An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

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:
\( \text{UP} = 1, \text{DOWN} = -1, \text{LEFT} = -1, \text{RIGHT} = 1, \text{CENTER} = 0. \)

**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 \((\text{start} . \text{end})\), where \(\text{start} \) and \(\text{end}\) 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 661), and `Slur` (page 680).

**3.2.131 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 (positive moment with no grace part)
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 649), and PaperColumn (page 656).

3.2.132 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 654),
and StaffSpacing (page 691).

3.2.133 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 605),
and SpacingSpanner (page 684).

3.2.134 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 684).

### 3.2.135 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 or clefs, `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 685).

3.2.136 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 538), BassFigureAlignmentPositioning (page 539), BassFigureContinuation (page 541), BassFigureLine (page 541), Beam (page 542), BendAfter (page 545), BendSpanner (page 546), CenteredBarNumber (page 554), CenteredBarNumberLineSpanner (page 555), ChordSquare (page 557), ClusterSpanner (page 563), DurationLine (page 587), DynamicLineWidthSpanner (page 589), DynamicTextSpanner (page 592), Episema (page 594), FingerGlideSpanner (page 595), Glissando (page 603), GraceSpacing (page 605), GridChordName (page 605), Hairpin (page 607), HorizontalBracket (page 609), HorizontalBracketText (page 610), InstrumentName (page 612), KievanLigature (page 622), LedgerLineSpanner (page 624), LigatureBracket (page 627), LyricExtender (page 629), LyricHyphen (page 629), LyricSpace (page 633), MeasureCounter
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In addition, this interface is supported conditionally by the following objects depending on their class: BalloonText (page 531), ControlPoint (page 568), ControlPolygon (page 569), Footnote (page 600), and Parentheses (page 657).

3.2.137 **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 689).
3.2.138 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 690).

3.2.139 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 691).

3.2.140 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 691).

3.2.141 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.

For ties, there is a distinction between exact and inexact values: an exact value serves as a rough vertical offset that gets further tuned to make the tie avoid staff lines. An inexact value is taken as the precise vertical offset without further adjustments.

This grob interface is used in the following graphical object(s): AmbitusNoteHead (page 528), Arpeggio (page 529), Beam (page 542), Clef (page 558), CueClef (page 571), CueEndClef (page 574), Custos (page 576), Dots (page 582), KeyCancellation (page 616), KeySignature (page 619), MultiMeasureRest (page 642), NoteHead (page 652), Rest (page 669), TabNoteHead (page 707), and TrillPitchHead (page 723).

3.2.142 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 692).
3.2.143 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-extreme-minimum-free-lengths**

List of extreme minimum free stem lengths (chord to beams) given beam multiplicity.

**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.

**lengths**

Default stem lengths. The list gives a length for each flag count. If a list entry is a pair, it gives the stem length for the specific up and down stem, respectively.

**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)
  
  An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob's `details` property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob's description section.

- **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.

default-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.

default-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.

This grob interface is used in the following graphical object(s): Stem (page 693).

3.2.144 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.

    style (symbol)
        This setting determines in what style a grob is typeset. Valid choices depend on the
        stencil callback reading this property.

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 696).

3.2.145 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.
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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 531), ControlPoint (page 568), ControlPolygon (page 569), Footnote (page 600), and Parentheses (page 657).

3.2.146 string-number-interface
A string number instruction.

  This grob interface is used in the following graphical object(s): StringNumber (page 697).

3.2.147 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 699).

3.2.148 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 814).

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.
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3.2.149 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 704), SystemStartBrace (page 705), SystemStartBracket (page 706), and SystemStartSquare (page 707).

3.2.150 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. If not a number, align on the object’s reference point.

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 612).

3.2.151 tab-note-head-interface
A note head in tablature.

The following properties may be set in the details list.

cautionsary-properties
  An alist to format cautionaries (usually parentheses enclosing the number) with the following elements.

  angularity
    How much the parentheses should become angular.

  half-thickness
    The maximum thickness of a parenthesis.

  padding
    The padding between the parentheses and the enclosed number.

  procedure
    A function to handle cautionaries, taking the other four elements of the cautionary-properties alist as arguments.

  width
    The maximum horizontal extent of a parenthesis.

harmonics
  An alist to format harmonics (usually parentheses enclosing the number) with the following elements.

  angularity
    How much the parentheses should become angular.

  half-thickness
    The maximum thickness of a parenthesis.

  padding
    The padding between the parentheses and the enclosed number.

  procedure
    A function to handle harmonics, taking the other four elements of the harmonic-properties alist as arguments.
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width
The maximum horizontal extent of a parenthesis.

head-offset
Move all tablature numbers horizontally. The value is given as a multiple of a single-digit number width.

repeat-tied-properties
An alist with the following elements.

note-head-visible
If set to #t, show a number for a note with \repeatTie.

parenthesize
If set to #t, parenthesize the number for a note with \repeatTie.

tied-properties
An alist with the following elements.

break-visibility
A vector of 3 booleans, #((end-of-line unbroken begin-of-line)), to control the visibility of ties over a line break. #t means visible, #f means killed.

parenthesize
If set to #t, parenthesize the number for a tied note after a line break.

User-settable properties:

details (alist, with symbols as keys)
An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob’s details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob’s description section.

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 707).

3.2.152 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, 'stacked, 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 531),
BarNumber (page 536), BassFigure (page 538), BendSpanner (page 546), BreathingSign
(page 550), CenteredBarNumber (page 554), ChordName (page 556), ClefModifier
(page 561), CodaMark (page 564), CombineTextScript (page 566), ControlPoint (page 568),
ControlPolygon (page 569), Divisio (page 578), DoublePercentRepeatCounter (page 584),
DynamicText (page 590), DynamicTextSpanner (page 592), Fingering (page 597), Footnote
(page 600), GridChordName (page 605), HorizontalBracketText (page 610), InstrumentName
(page 612), InstrumentSwitch (page 613), JumpScript (page 614), LyricRepeatCount
(page 631), LyricText (page 633), MeasureCounter (page 635), MeasureSpanner (page 638),
MetronomeMark (page 640), MultiMeasureRestNumber (page 644), MultiMeasureRestText
(page 647), NoteName (page 653), OttavaBracket (page 655), PercentRepeatCounter
(page 660), RehearsalMark (page 664), SectionLabel (page 672), SegnoMark (page 674),
SostenutoPedal (page 682), StaffEllipsis (page 687), StanzNumber (page 692),
StringNumber (page 697), StrokeFinger (page 699), SustainPedal (page 700), TabNoteHead
(page 707), TextMark (page 710), TextScript (page 712), TupletNumber (page 727),
UnaCordaPedal (page 728), and VoltaBracket (page 735).

3.2.153 text-mark-interface
A textual mark.

This grob interface is used in the following graphical object(s): TextMark (page 710).

3.2.154 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.
3.2.155 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 a desired tie configuration that overrides the default. position is the offset from the center of the staff in half staff-space units, 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.
  - There is a distinction between exact and inexact values for position: an exact value serves as a rough vertical offset that gets further tuned to make the tie avoid staff lines. An inexact value is taken as the precise vertical offset without further adjustments.

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 717).

3.2.156 tie-interface

A tie – a horizontal curve connecting two noteheads.

The following properties may be set in the details list.

- between-length-limit
  - This detail is currently unused.

- 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.

- 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.

- height-limit
  - The maximum height allowed for this tie.

- horizontal-distance-penalty-factor
  - Demerit factor for ties in the set being considered which are horizontally distant from the note heads.

- 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.
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.

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.

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.

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.

ratio
Parameter for tie shape. The higher this number, the quicker the slur attains its height limit.

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.

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.

skyline-padding
Padding of the skylines around note heads in chords.

staff-line-collision-penalty
Demerit factor for ties whose tips or center come close to staff lines.

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.

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.
vertical-distance-penalty-factor
Demerit factor for ties in the set being considered which are vertically distant from the note heads.

wrong-direction-offset-penalty
Demerit for ties that are offset in the wrong direction.

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)
An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob's details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob's description section.
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. For ties, there is a distinction between exact and inexact values: an exact value serves as a rough vertical offset that gets further tuned to make the tie avoid staff lines. An inexact value is taken as the precise vertical offset without further adjustments.
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 623), RepeatTie (page 667), and Tie (page 715).

3.2.157 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 as two numbers. 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-mensual style
mensuration marks. All other time signatures are written as two numbers.

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 mensu-
ration marks. All other time signatures are written as two numbers.

single-number
    All time signatures are typeset as a single number, e.g., 3/2 is written as 3.

numbered
    All time signatures are typeset as two numbers.

User-settable properties:

fraction (fraction, as pair)
    Numerator and denominator of a time signature object.

senza-misura-stencil (stencil)
    The symbol to print when TimeSignature.fraction is not set. Overriding
    TimeSignature.stencil circumvents this.

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 718).

3.2.158 trill-pitch-accidental-interface
An accidental for trill pitch.

This grob interface is used in the following graphical object(s): TrillPitchAccidental
(page 720).

3.2.159 trill-spanner-interface
A trill spanner.

This grob interface is used in the following graphical object(s): TrillSpanner (page 724).
3.2.160  **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 #f 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)
  A pair of numbers specifying how much a broken spanner sticks out of its bounds horizontally on the broken side(s). For broken beams and broken tuplet brackets, the bounds are given by the prefatory matter on the left and/or the rightmost column on the right. For broken horizontal brackets, the bounds are the leftmost and/or rightmost column; for broken measure spanners, the left and/or right edge of the staff.

- **connect-to-neighbor** (pair)
  Pair of booleans, indicating whether this grob looks as a continued break.

- **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.

- **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.
max-slope-factor (non-negative number)
   Factor for calculating the maximum tuplet bracket slope. Notice that there exists a
   homonymous property for slurs.

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.

span-all-note-heads (boolean)
   If true, tuplet brackets are printed spanning horizontally from the first to the last
   note head instead of covering only the stems.

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:**

beam (graphical (layout) object)
   A pointer to the beam, if applicable.

note-columns (array of grobs)
   An array of NoteColumn grobs.

potential-beam (graphical (layout) object)
   For tuplet brackets, a grob to use as parallel beam unless the tuplet is broken.

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 627), and TupletBracket (page 725).

3.2.161 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 727).

3.2.162 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 542), DurationLine (page 587), and Glissando (page 603).

3.2.163 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 or clefs, 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 652), and VaticanaLigature (page 731).

3.2.164 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.

musical-length (non-negative moment with no grace part)
Musical length.

range-collapse-threshold (non-negative, exact integer)
If the length of a volta range is greater than or equal to this threshold, print it with a dash. For example, if this is 3, a \volta 1,2,3 is printed as ‘1.-3.’, but if it is 4, it is printed as ‘1.2.3.’.

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).

\texttt{volta-number-offset} (pair of numbers)
The offset of the volta number relative to the upper left corner of the volta bracket.

**Internal properties:**

- \texttt{bars-left} (array of grobs)
  An array of bar line pointers for the left side of a volta bracket.

- \texttt{bars-right} (array of grobs)
  An array of bar line pointers for the right side of a volta bracket.

- \texttt{volta-numbers} (number list)
  List of volta numbers.

This grob interface is used in the following graphical object(s): \texttt{VoltaBracket} (page 735).

### 3.2.165 volta-interface

A volta repeat.

This grob interface is used in the following graphical object(s): \texttt{VoltaBracket} (page 735), and \texttt{VoltaBracketSpanner} (page 736).

### 3.3 User backend properties

- \texttt{accidental-padding} (number)
  Property used by Beam to avoid accidentals in whole note tremolos.

- \texttt{add-stem-support} (boolean)
  If set, the \texttt{Stem} object is included in this script’s support.

- \texttt{after-line-breaking} (boolean)
  Dummy property, used to trigger callback for \texttt{after-line-breaking}.

- \texttt{align-dir} (direction)
  Which side to align? -1: left side, 0: around center of width, 1: right side.

- \texttt{allow-loose-spacing} (boolean)
  If set, column can be detached from main spacing.

- \texttt{allow-span-bar} (boolean)
  If false, no inter-staff bar line will be created below this bar line.

- \texttt{alteration} (number)
  Alteration numbers for accidental.

- \texttt{alteration-alist} (association list (list of pairs))
  List of (\textit{pitch} . \textit{accidental}) pairs for key signature.

- \texttt{alteration-glyph-name-alist} (association list (list of pairs))
  An alist of key-string pairs.

- \texttt{annotation-balloon} (boolean)
  Print the balloon around an annotation.

- \texttt{annotation-line} (boolean)
  Print the line from an annotation to the grob that it annotates.

- \texttt{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 #f 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)
   A pair of numbers specifying how much a broken spanner sticks out of its bounds hori-
   zontally on the broken side(s). For broken beams and broken tuplet brackets, the bounds
   are given by the prefatory matter on the left and/or the rightmost column on the right.
   For broken horizontal brackets, the bounds are the leftmost and/or rightmost column; for
   broken measure spanners, the left and/or right edge of the staff.

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.

cord-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)
An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 520, for more information on the available parameters and their default values of a particular grob's details property. See Section 3.2 [Graphical Object Interfaces], page 739, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob's description section.

**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', 'stacked', 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 (Em-
    mentaler), fetaBraces, fetaText (Emmentaler).

font-family (symbol)
    The font family is the broadest category for selecting text fonts. Options include serif, san
    and typewriter.

font-features (list)
    Opentype features.

font-name (string)
    This property is kept for backwards compatibility only. Use the fonts property instead.

font-series (symbol)
    Select the series of a font. Common choices are normal and bold. The full list of symbols
    that can be used is: thin, ultralight, light, semilight, book, normal, medium, semibold,
    bold, ultrabold, heavy, ultraheavy.

font-shape (symbol)
    Select the shape of a font. Possible values are upright, italic, oblique, and slanted
    (which is the same as oblique).

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.

font-stretch (symbol)
    Select a condensed or expanded font, if available in the font family. Possible values
    are ultra-condensed, extra-condensed, condensed, semi-condensed, normal, semi-expanded,
    expanded, extra-expanded, and ultra-expanded.

font-variant (symbol)
    Select the variant of a font. Choices include normal and small-caps.
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fonts (alist, with symbols as keys)
   An alist mapping font families to font names. The standard font families are music, serif, sans and typewriter.

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 down-stem voice note; if there are no down-stem voices, the width of the first up-stem voice note is taken instead. 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 \( \text{thickness} \times (1 + \text{string-thickness-factor})^{(k-1)} \). 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 or clefs, 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-slope-factor (non-negative number)
Factor for calculating the maximum tuplet bracket slope. Notice that there exists a homonymous property for slurs.

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 co-ordinates (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 (positive moment with no grace part)
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-X-space (dimension, in staff space)
Minimum distance that the victim should move horizontally (after padding), overriding the minimum-space property value.

minimum-Y-extent (pair of numbers)
Minimum size of an object in Y dimension, measured in staff-space units.

musical-length (non-negative moment with no grace part)
Musical length.

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 is it very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

outside-staff-padding (number)
The padding to place between grobs when spacing according to outside-staff-priority. Two grobs with different outside-staff-padding values have the larger value of padding between them.

outside-staff-placement-directive (symbol)
One of four directives telling how outside staff objects should be placed.

- left-to-right-greedy – Place each successive grob from left to right.
- left-to-right-polite – Place a grob from left to right only if it does not potentially overlap with another grob that has been placed on a pass through a grob array. If there is overlap, do another pass to determine placement.
- right-to-left-greedy – Same as left-to-right-greedy, but from right to left.
- right-to-left-polite – Same as left-to-right-polite, but from right to left.

outside-staff-priority (number)
If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller outside-staff-priority is closer to the staff.

packed-spacing (boolean)
If set, the notes are spaced as tightly as possible.

padding (dimension, in staff space)
Add this much extra space between objects that are next to each other.
padding-pairs (association list (list of pairs))

An alist of padding pairs for key signatures (and key cancellations). Each alist entry has the form

\[((\text{left-glyph-name} . \text{right-glyph-name}) . \text{dist})\]

specifying the padding \text{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 \text{KeySignature} (or \text{KeyCancellation}) grob is used instead.

A special feature is the handling of adjacent naturals (to be more precise, the handling of glyph \text{accidentals.natural}): If there is no ‘natural-natural’ entry in \text{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 not a number, align on the parent’s reference point. 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 (\text{start} . \text{end}), where \text{start} and \text{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.

range-collapse-threshold (non-negative, exact integer)
If the length of a volta range is greater than or equal to this threshold, print it with a dash.
For example, if this is 3, a \volta 1,2,3 is printed as '1.-3.', but if it is 4, it is printed as
'1.2.3.'.

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))
A list 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-justified (boolean)
Used for BarLines to right-align them. Usually the extent of a BarLine has some positive
value to the right. If this property is set to #t, BarLine.stencil is translated to the left
by this value. Needs to be set at Score or StaffGroup level. As a result all BarLines of
said Score or StaffGroup are right-justified.

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. If not a number, align on the object’s reference point.

self-alignment-Y (number)
   Like self-alignment-X but for the Y axis.

senza-misura-stencil (stencil)
   The symbol to print when TimeSignature.fraction is not set. Overriding TimeSignature 
   .stencil circumvents this.

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.

short-bar-extent (pair of numbers)
   The Y-extent of a short bar line. The default is half the normal bar extent, rounded up to 
   an integer number of staff spaces.
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 #t 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)

If space-alist is defined for a grob that gets spaced in a staff, an entry for first-note must be present. If there is no next-note entry, the value of first-note is used instead.

Choices for spacing-style are:

- **extra-space**
  Put this much space between the two grobs. The space is stretchable and shrinkable 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 and shrinkable 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 and shrinkable.

- **shrink-space**
  Only compatible with first-note and next-note. Put this much space between the two grobs. The space is only shrinkable.

- **semi-shrink-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 shrinkable.
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:
    
    ```latex
    \override MultiMeasureRest.spacing-pair = #'(staff-bar . staff-bar)
    ```

**span-all-note-heads** (boolean)
- If true, tuplet brackets are printed spanning horizontally from the first to the last note head instead of covering only the stems.

**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.
  - For ties, there is a distinction between exact and inexact values: an exact value serves as a rough vertical offset that gets further tuned to make the tie avoid staff lines. An inexact value is taken as the precise vertical offset without further adjustments.

**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 a desired tie configuration that overrides the default. position is the offset from the center of the staff in half staff-space units, 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.

   There is a distinction between exact and inexact values for position: an exact value serves as a rough vertical offset that gets further tuned to make the tie avoid staff lines. An inexact value is taken as the precise vertical offset without further adjustments.

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.

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.

volta-number-offset (pair of numbers)
The offset of the volta number relative to the upper left corner of the volta bracket.

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 be-
yond 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-alignment-extent (pair of numbers)
If a grob wants to align itself on a PaperColumn grob that doesn’t contain note heads, use
this horizontal extent as a placeholder.

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.
Note that many objects have special positioning considerations, which cause any
setting of X-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).

X-padding (dimension, in staff space)
Add this much extra space between objects that are next to each other horizontally, over-
riding the padding property value.

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.
Note that many objects have special positioning considerations, which cause any
setting of Y-offset to be ignored or modified, even though the object supports the
self-alignment-interface (page 803).

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-left (array of grobs)
   An array of bar line pointers for the left side of a volta bracket.

bars-right (array of grobs)
   An array of bar line pointers for the right side of a volta bracket.

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 549), in a NonMusicalPaperColumn (page 649).

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 rela-
    tive 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 diminished?

descendens (boolean)
    Is this neume of descendent type?

direction-source (graphical (layout) object)
    In case side-relative-direction is set, which grob to get the direction from.

display-cautionary (boolean)
    Should the grob be displayed as a cautionary grob?

dot (graphical (layout) object)
    A reference to a Dots object.

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-stencil (stencil)
  The stencil of a system’s in-notes.

in-note-system-padding (number)
  Padding between in-note and its associated system.

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-down-stem (boolean)
request a downward left stem for an initial breve in a ligature.

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.

potential-beam (graphical (layout) object)
   For tuplet brackets, a grob to use as parallel beam unless the tuplet is broken.

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-down-stem (boolean)
  request a downward right stem for a maxima in a ligature.

right-items (array of grobs)
  Grobs organized on the right by a spacing object.

right-neighbor (graphical (layout) object)
  See left-neighbor.

right-up-stem (boolean)
  request an upward right stem for a final longa or maxima in a ligature.

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.

stropha (boolean)
   Is this neume a stropha?

system-Y-offset (number)
   The Y-offset (relative to the bottom of the top-margin of the page) of the system to which this staff belongs.

tie (graphical (layout) object)
   A pointer to a Tie object.

ties (array of grobs)
   A grob array of Tie objects.

tremolo-flag (graphical (layout) object)
   The tremolo object on a stem.

tuplet-number (graphical (layout) object)
   The number for a bracket.

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?

volta-numbers (number list)
   List of volta numbers.

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 glyph proc
   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
   Adds the given context modification to the list contextmods of context modifications.

add-grace-property context-name grob sym val
   Set sym= val for grob in context-name.

ly:add-interface iface desc props
   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
   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-new-clef clef-name clef-glyph clef-position transposition c0-position
   Add a new clef to the list of supported clefs.
   The arguments clef-name, clef-glyph, clef-position, and transposition are used to add
an entry to the supported-clefs list. Arguments clef-glyph and c0-position extend
c0-pitch-alist.

ly:add-option sym val description rest
   Add program option sym with default value val and docstring description.
   LilyPond uses this function to define Scheme options available on the command line (given
by -d or --define-default).

After start-up, command-line Scheme options are provided to LilyPond by function
ly:command-line-options, which returns a key-value list where all values are Scheme
strings. Use the optional argument #:type to specify how such a value string for key sym
should be processed by ly:set-option.
   - If set to symbol string, don’t do any further conversion and accept the value as a
   string. This is also necessary if a potentially fitting type predicate gets defined after
LilyPond’s command-line option handling (for example, ly:duration?). In such cases,
type checking should be performed manually later on.
   - If set to symbol string-or-false, do the same as with string but convert a string
value "#f" to Boolean value #f.
   - If set to a procedure, handle the value as a Scheme expression and use the procedure as
a predicate to check whether the value fits. This is also the default behaviour if #:type
is not set, using boolean? as the procedure.
   - If set to a list, handle the value as a Scheme expression and check whether it is one of
the list’s elements (using equal? for the comparison test).

’Handling as a Scheme expression’ means that the string gets passed to the read Scheme
function, which stops reading after the first complete Scheme expression has been parsed. As
a consequence, both strings “foo” and "foo bar" get converted to symbol foo, while a string
"(foo" causes an error because the Scheme expression is not complete.
Passing #:internal? #t makes the option an internal option, not displayed in the lilypond
-dhelp output (but displayed in lilypond -dhelp-internal).
Passing #:accumulative? #t makes the option accumulative, which gathers -d values in a list instead of letting the last -d flag overwrite the others.

add-simple-time-signature-style style proc
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 stencil grob dir stroke-style flag-style
Add a stroke glyph (from the music font) to the given flag stencil.
This is an auxiliary function for create-glyph-flag.

add-stroke-straight stencil grob dir log stroke-style offset length thickness stroke-thickness
Add an acciaccatura stroke to the given flag stencil.
This is an auxiliary function for straight-flag.

alist->hash-table lst
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
Return the hash table with all grob interface descriptions.

ly:all-options
Get all option settings in an alist.

ly:all-output-backend-commands
Return the list of extra output backend commands that are used internally in file lily/stencil-interpret.cc.

ly:all-stencil-commands
Return the list of stencil commands that can be defined in the output modules (in files output-*.scm).

ly:all-stencil-expressions
Return all symbols recognized as stencil expressions.

allow-volta-hook bar-glyph
Allow the volta bracket hook being drawn over bar line bar-glyph.

alterations-in-key pitch-list
Count number of sharps minus number of flats.

ly:angle x y
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 angle
Take angle (in radians) and map it between 0 and 2pi.

angle-0-360 angle
Take angle (in degrees) and map it between 0 and 360 degrees.
ly:append-to-option var val
   Add value val to an accumulative program option var.
   See also function ly:add-option.

array-copy/subarray! src dst offsets ... [Function]
   Similar to array-copy, but takes extra parameters for the start of a subarray where to copy.
   For example:
   (let ((arr (make-array 'a 4 4))
         (to-copy (make-array 'b 2 2)))
       (array-copy/subarray! to-copy arr 2 1) arr)
   ⇒ #2((a a a a)
       (a a a a)
       (a b b a)
       (a b b a))

arrow-stencil x y thick staff-space grob [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 start? end? [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?.

assert ... [Macro]
   Use (assert condition) or (assert condition extra-failure-message) to check that
   condition is true, and raise an error otherwise. Use this for conditions that should always be
   true, barring bugs; raise a more informative error if protecting against a user error.

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 substitute-type [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 grob [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 grob [Function]
   Calculate the visibility of a bar line at line breaks.
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bar-line::calc-glyph-name grob
Return the name of the bar line glyph printed by grob for the actual break direction.

bar-line::calc-glyph-name-for-direction glyphs dir
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 grob bar-glyph extent
Build the bar line stencil.

bar-line::draw-filled-box x-ext y-ext thickness extent grob
Return a straight bar line created by ly:round-filled-box looking at x-ext, y-ext, and thickness. The blot is calculated from extent and grob. y-ext is not necessarily equal to extent.

ly:bar-line::print grob
The print routine for bar lines.

bar-line::widen-bar-extent-on-span grob extent
Widen the bar line extent towards span bars adjacent to grob grob.

base-length time-signature time-signature-settings
Get baseMoment rational value for time-signature from time-signature-settings.

ly:base64-encode bv
Encode the given bytevector as a base 64 string.

ly:basic-progress str rest
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 time-signature time-signature-settings
Get beamExceptions value for time-signature from time-signature-settings.

beat-structure base-length time-signature time-signature-settings
Get beatStructure value in base-length units for time-signature from time-signature-settings.

bend::arrow-head-stencil thickness x-y-coords height width dir
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 bend-spanner bounding-noteheads factor quarter-tone-diffs
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 bend-spanner top-left-tab-nhd top-right-tab-nhd
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 spanner
Set 'display-cautionary of all relevant note heads of spanners right bound to #t. As a result they appear parenthesized. This procedure is the default value of 'before-line-breaking.

bend::text-string spanner
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 grob
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
Compute the extent of the Bézier curve defined by control-points along axis.

ly:bezier-extract control-points t-min t-max
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.

bit-list->byte-list bit-list
Convert the given list of bits (booleans), whose length must be a multiple of 8, into a list of bytes (integers between 0 and 255).

bit-list->int bit-list
Convert the given list of booleans to the number that it represents in binary.

ly:book? x
Is x a smob of class Book?


ly:book-add-score! book-smob score
Add score to book-smob score list.


book-first-page layout props
Return the 'first-page-number of the entire book.

Return header in book.

Return paper in book.

Print book. output is passed to the backend unchanged. For example, it may be a string (for file based outputs) or a socket (for network based output).

Print book. output is passed to the backend unchanged. For example, it may be a string (for file based outputs) or a socket (for network based output).
ly:book-scores book
Return scores in book.

Set the book header.

box-grob-stencil grob
Make a box of exactly the extents of the grob. The box precisely encloses the contents.

box-stencil stencil thickness padding
Add a box around stencil, producing a new stencil.

ly:bp num
num bigpoints (1/72th inch).

ly:bracket a iv t p
Make a bracket in direction a. The extent of the bracket is given by iv. The wings protrude by an amount of p, which may be negative. The thickness is given by t.

bracketify-stencil stil axis thick protrusion padding
Add brackets around stil, producing a new stencil.

break-alignable-interface::self-alignment-of-anchor g
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 g
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
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 end-of-line middle begin-of-line
Return a callback that calculates a value based on a grob’s break direction.

ly:broadcast disp ev
Send the stream event ev to the dispatcher disp.

byte-list->bit-list byte-list
Convert a list of bytes (integers between 0 and 255) into a list of bits (booleans).

caesura-script-interface::before-line-breaking script
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 context caesura-type observations
caesuraTypeTransform callback to print articulated caesurae as chant breath marks using the infrastructure for modern bar lines when possible.

caesura-to-divisio context caesura-type observations
caesuraTypeTransform callback to print articulated caesurae as chant breath marks.
ly:cairo-output-stencil  
basename stencil  
paper formats  
dump a single stencil through the Cairo backend

ly:cairo-output-stencils  
basename stencils  
header paper formats  
dump book through cairo backend

calc-harmonic-pitch pitch music  
Calculate the harmonic pitches in music given pitch as the non-harmonic pitch.

calc-measure-length time-signature  
Calculate the measure length for time-signature.

ly:camel-case->lisp-identifier name-sym
Convert FooBar_Bla to foo-bar-bla style symbol.

centered-spanner-interface::calc-x-offset grob  
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 stencil  
Center stencil stencil in both the x and y directions.

ly:chain-assoc-get key achain default-value strict-checking  
Return value for key from a list of alists achain. If no entry is found, return default-value or #f if default-value is not specified. With strict-checking set to #t, a programming error is output in such cases.

chain-assoc-get . . [... [..]]  
- LilyPond procedure: ly:chain-assoc-get (SCM key, SCM achain, SCM default_value, SCM strict_checking)

change-pitches music converter  
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 path [location]  
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  
Check whether all expected warnings have really been triggered.

check-grob-path path rest . . .  
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 path 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 B-instead-of-Bb   [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 french?   [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 stencil thickness padding   [Function]
Add a circle around stencil, producing a new stencil.

clef-modifier::print grob   [Function]
Callback for ClefModifier grob.

clef-transposition-markup oct style   [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.

Book music handler.

collect-bookpart-for-book book-part   [Function]
Top-level book-part handler.

collect-music-aux score-handler music   [Function]
Pass music to score-handler, with preprocessing for page layout instructions.

collect-music-for-book music   [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.

Return a key-value alist, with keys being symbols and values being strings.

comparator-from-key key cmp   [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
Make the dispatcher to listen to events from from.

construct-chord-elements root duration modifications
Build a chord on root using modifiers in modifications. Note Events have duration duration.
Notes: Natural 11 is left from chord if not explicitly specified.
Entry point for the parser.

ly:context? x
Is x a smob of class Context?

ly:context-children context
Return a list with the children contexts of context.

ly:context-current-moment context
Return the current moment of context.

ly:context-def? x
Is x a smob of class Context_def?

ly:context-def-lookup def sym val
Return the value of sym in context definition def (e.g., \Voice). If no value is found, return val or () if val is undefined. sym can be any of 'default-child', 'consists', 'description', 'aliases', 'accepts', 'property-ops', 'context-name', 'group-type'.

ly:context-def-modify def mod
Return the result of applying the context-mod mod to the context definition def. Does not change def.

ly:context-event-source context
Return event-source of context context.

ly:context-events-below context
Return a stream-distributor that distributes all events from context and all its subcontexts.

ly:context-find context name
Find a parent of context that has name or alias name. Return #f if not found.

ly:context-grob-definition context name
Return the definition of name (a symbol) within context as an alist.

ly:context-id context
Return the ID string of context, i.e., for \context \Voice = "one" ... return the string one.

ly:context-matched-pop-property context grob cell
This undoes a particular \override, \once \override or \once \revert when given the specific alist pair to undo.

ly:context-mod? x
Is x a smob of class Context_mod?

ly:context-mod-apply! context mod
Apply the context modification mod to context.

ly:context-name context
Return the name of context, i.e., for \context \Voice = "one" ... return the symbol Voice.
ly:context-output-def context
Return the output definition of context.

ly:context-parent context
Return the parent of context, #f if none.

ly:context-property context sym def
Return the value for property sym in context. If def is given, and property value is '()', return def.

ly:context-property-where-defined context name def
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
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-schedule-moment context moment
Add the given moment moment (which must lie in the future) to the list of moments to process for the global context governing context. This makes it possible for translators ( engravers, performers) to see moments not directly created by user input.

ly:context-set-property! context name val
Set value of property name in context context to val.

copy-repeat-chord original-chord repeat-chord duration event-types
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 lst
Given lst as (E1 E2 .. ), return ((E1 . 1) (E2 . 2) .. ).

create-glyph-flag flag-style dir-modifier grob
Create a flag stencil by looking up the glyph from the music font.
This is an auxiliary function for mensural-flag, glyph-flag, and normal-flag.

cross-staff-connect stem
Set cross-staff property of the stem to this function to connect it to other stems automatically.

cue-substitute quote-music
Must happen after quote-substitute.

cyclic-base-value value cycle
Take value (for example, an angle) and modulo-maps it between 0 and base cycle.

ly:debug str rest
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 grob**  
[Function]  
Create a flag stencil for the stem.

The flag style is derived from the style property of grob (which must be of type Flag).

By default, LilyPond uses a C++ function (which is slightly faster) to do exactly the same as this function. However, if you want to modify the default flags this function can be used to obtain the default flag stencil, which can then be modified at will.

The available, predefined values for style are "" (empty, for normal flags), "mensural", and "no-flag". Other values are used to construct glyph names for flags; see function glyph-flag for details.

Example:

```latex
\override Flag.stencil = #default-flag  
\override Flag.style = #'mensural
```

**ly:default-scale**  
[Function]  
Get the global default scale.

**define-bar-line bar-glyph eol-glyph bol-glyph span-glyph**  
[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 class parent**  
[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 paper define-font define-pango-pf**  
[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:

```s-expression
(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

```s-expression
(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

\[
\text{(make-command-markup arg1 arg2 \ldots)}
\]

(without layout and props arguments). This yields a markup. Interpreting it, using

\[
\text{(interpret-markup markup layout props)}
\]

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:

\[
\text{(define-music-function (arg1 arg2 \ldots)}
\]

\[
\text{(type1? type2? \ldots)}
\]

\[
\text{function-body)}
\]

*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-syntactic-function** ... [Macro]
Helper macro for `ly:make-music-function`. Syntax:

\[
\text{(define-syntactic-function result-type?}
\]

\[
\text{...)}
\]
(arg1 arg2 ...)  
(type1? type2? ...)  

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 tags  
[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 angle-degrees  
[Function]  
Convert the given angle from degrees to radians.

descend-to-context m context [id [mods]]  
[Function]  
Like context-spec-music, but only descending.

determine-split-list evl1 evl2 chord-range  
[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 context notes specified-info rest  
[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 file 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
Is x a smob of class Dispatcher?

display-lily-music expr [port]
Display the music expression expr using LilyPond syntax.

display-music music [port]
Display music, not done with music-map for clarity of presentation.

display-scheme-music obj [port]
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 context pitch barnum
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
Is x a smob of class Duration?

ly:duration<? p1 p2
Is p1 shorter than p2?

ly:duration->string dur
Convert dur to a string.

ly:duration-compress dur factor
Compress dur by rational factor.

ly:duration-dot-count dur
Extract the dot count from dur.

duration-dot-factor dotcount
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
Extract the compression factor from dur. Return it as a pair.

ly:duration-length dur
The length of the duration as a moment.

duration-length dur
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 grob
Return list of values needed to print a stencil for DurationLine.

duration-line::print grob
Return the stencil of DurationLine.

ly:duration-log dur
Extract the duration log from dur.

duration-log-factor lognum
Given a logarithmic duration number, return the length of the duration, as a number of whole notes.
ly:duration-scale dur
Extract the compression factor from dur. Return it as a rational.

duration-visual dur
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 dur
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 grob
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
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 coords mirrored?
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 stencil thickness x-padding y-padding
Add an ellipse around stencil, padded by the padding pair, producing a new stencil.

end-broken-spanner? spanner
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
Announce the end of a grob (i.e., the end of a spanner) originating from given engraver instance, with grob being a grob. cause should either be another grob or a music event.

ly:engraver-make-grob engraver grob-name cause
Create a grob originating from given engraver instance, with given grob-name, a symbol. cause should either be another grob or a music event.
ly:engraver-make-item  \textit{engraver grob-name cause}  \hspace{1cm} \text{[Function]}
Same as \texttt{ly:engraver-make-grob}, but always create a grob with the \texttt{Item} class. This is useful when the same grob definition is used to create grobs of differing classes.

ly:engraver-make-spanner  \textit{engraver grob-name cause}  \hspace{1cm} \text{[Function]}
Same as \texttt{ly:engraver-make-grob}, but always create a grob with the \texttt{Spanner} class. This is useful when the same grob definition is used to create grobs of differing classes.

ly:engraver-make-sticky  \textit{engraver grob-name host cause}  \hspace{1cm} \text{[Function]}
Utility function to create a grob sticking to another grob. This acts like either \texttt{ly:engraver-make-item} or \texttt{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 \texttt{sticky-grob-interface} interface, see Section “sticky-grob-interface” in \textit{Internals Reference}.

ly:error \texttt{str rest}  \hspace{1cm} \text{[Function]}
A Scheme callable function to issue the error \texttt{str}. The error is formatted with \texttt{format}; \texttt{rest} holds the formatting arguments (if any).

eval-carefully \texttt{symbol module default ...}  \hspace{1cm} \text{[Function]}
Check whether all symbols in expression \texttt{symbol} are reachable in module \texttt{module}. In that case evaluate, otherwise print a warning and set an optional \texttt{default}.

ly:event? \texttt{obj}  \hspace{1cm} \text{[Function]}
Is \texttt{obj} a proper (non-rhythmic) Event object?

event-chord-notes \texttt{event-chord}  \hspace{1cm} \text{[Function]}
Return a list of all notes from \texttt{event-chord}.

event-chord-pitches \texttt{event-chord}  \hspace{1cm} \text{[Function]}
Return a list of all pitches from \texttt{event-chord}.

event-chord-reduce \texttt{music}  \hspace{1cm} \text{[Function]}
Reduce event chords in \texttt{music} to their first note event, retaining only the chord articulations. Returns the modified music.

event-chord-wrap! \texttt{music}  \hspace{1cm} \text{[Function]}
Wrap isolated rhythmic events and non-postevent events in \texttt{music} inside of an EventChord. Chord repeats ‘q’ are expanded using the default settings of the parser.

ly:event-deep-copy \texttt{m}  \hspace{1cm} \text{[Function]}
Copy \texttt{m} and all sub-expressions of \texttt{m}.

event-has-articulation? \texttt{event-type stream-event}  \hspace{1cm} \text{[Function]}
Is \texttt{event-type} in the articulations list of the music causing \texttt{stream-event}?

ly:event-length \texttt{event moment}  \hspace{1cm} \text{[Function]}
Return the length of a stream event. If \texttt{moment} is not given, this is just the event’s \texttt{length} property. If \texttt{moment} is given and is an in-grace moment (i.e. having non-zero, usually negative, grace part), then the length of the stream event is returned as a grace-only moment. In any case, thus, the effective length of the stream event when happening at \texttt{moment} is returned.

ly:event-property \texttt{sev sym val}  \hspace{1cm} \text{[Function]}
Get the property \texttt{sym} of stream event \texttt{sev}. If \texttt{sym} is undefined, return \texttt{val} or ‘() if \texttt{val} is not specified.
**ly: event-set-property! ev sym val**
Set property sym in event ev to val.

**expand-repeat-chords! event-types music**
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! music**
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**
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 music**
Create a value useful for setting beamExceptions from music.

**extract-music music pred?**
Return a flat list of all music matching pred? inside of music, not recursing into matches themselves.

**extract-named-music music music-name**
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**
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 music type**
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.

**figured-bass-continuation:: print grob**
Callback for BassFigureContinuation grobs.

**ly: find-file name strict**
Return the absolute file name of name. By default, if the file is not found, return #f. If the optional parameter strict is passed as #t, raise an error in this case instead.

**find-named-props prop-name grob-descriptions**
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 keysig pitch accept-global accept-local**
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 grob

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 keys lst

Return first successful assoc of key from keys in lst.

first-broken-spanner? spanner

Is spanner broken and the first of its broken siblings? See also unbroken-or-first-broken-spanner?.

first-member members lst

Return first successful member (of member) from members in lst.

flat-flag grob

A callback function for Flag.stencil to get a flat flag.

The up-stem and down-stem angles of the flags are both 0 degrees. If the caller sets the stroke-style property of grob to the string "grace", add a slash through the flag.

This function returns a stencil.

flat-zip-longest lsts . . .

Return a list made of the first element from the first list, then the first element from the second list, . . . , the second element from the first list, . . . , until all lists are exhausted. For example:

\[
\text{(flat-zip-longest '(a b c d) '(e f) '(g h i)) } \Rightarrow ' (a e g b f h c i d) 
\]

flatten-list x

Unnest list.

flip-stencil axis stil

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 pred? proc init music

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'.

fold-values proc lst init\s . . .

A variant of fold that works on one list only, but allows proc to return multiple values, and can itself return multiple values. The calls to proc are (proc list-elem previous1 previous2 . . . ). Note that the init\s arguments are given after lst in the signature, unlike fold.

ly:font-config-add-directory dir

Add directory dir to FontConfig.

ly:font-config-add-font font

Add font font to FontConfig.
ly:font-config-display-fonts port

List all fonts visible to FontConfig, together with directory information.

Optional argument port selects the output port; the default is (current-error-port).

ly:font-config-get-font-file name

Get the file for font name, as found by FontConfig.

ly:font-design-size font

Given the font metric font, return the design size, relative to the current output-scale.

ly:font-file-name font

Given the font metric font, return the corresponding file name.

ly:font-get-glyph font name

Return a stencil from font for the glyph named name. If the glyph is not available, return an empty stencil.

Note that this command can only be used to access glyphs from fonts loaded with ly:system-font-load; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings fetaMusic and fetaBraces, respectively.

ly:font-glyph-name-to-index font name

Return the index for name in font.

Note that this command can only be used to access glyphs from fonts loaded with ly:system-font-load; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings fetaMusic and fetaBraces, respectively.

ly:font-index-to-charcode font index

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

Given the font metric font, return the magnification, relative to the current output-scale.

ly:font-metric? x

Is x a smob of class Font_metric?

ly:font-name font

Given the font metric font, return the corresponding name.

font-name-split font-name

Return (font-name . design-size) from font-name string or #f.

for-some-music stop? music

Walk through music, process all elements calling stop? and only recurse if this returns #f.

ly:format str rest

LilyPond specific format function, supporting ~a and ~[0-9]f. Basic support for ~s is also provided.

ly:format-output context

Given a global context in its final state, process it and return the Music_output object in its final state.
format-segno-mark-considering-bar-lines \textit{segno-number context} \hspace{1em} \textbf{[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.

\textit{fret-\rightarrow\textit{pitch fret}} \hspace{1em} \textbf{[Function]}

Calculate a pitch given \textit{fret} for the harmonic.

\textit{fret-parse-terse-definition-string \textit{props definition-string}} \hspace{1em} \textbf{[Function]}

Parse a fret diagram string that uses terse syntax; return a pair containing \textit{props}, modified to include the string-count determined by \textit{definition-string}, and a fret indication list with the appropriate values.

\textit{function-chain \textit{arg function-list}} \hspace{1em} \textbf{[Function]}

Apply a list of functions in \textit{function-list} to \textit{arg}. Each element of \textit{function-list} is structured \((\text{cons function `(arg2 arg3 ...))}\). If function takes arguments besides \textit{arg}, they are provided in \textit{function-list}. Example:

\[(\text{function-chain} 1 '\((, + 1) \, (- 2) \, (+ 3) \, (/))\) \Rightarrow \frac{1}{3}\]

\textit{generate-crop-stencil paper-book} \hspace{1em} \textbf{[Function]}

Returns a stencil for the cropped output of the given \textit{Paper_book}

\textit{generate-preview-stencil paper-book} \hspace{1em} \textbf{[Function]}

Returns a stencil for a preview of given \textit{Paper_book}

\textit{ly:generic-bound-extent \textit{grob common}} \hspace{1em} \textbf{[Function]}

Determine the extent of \textit{grob} relative to \textit{common} along the x axis, finding its extent as a bound when it a has \textit{bound-alignment-interfaces} property list set and otherwise the full extent.

\textit{ly:get-all-function-documentation} \hspace{1em} \textbf{[Function]}

Get a hash table with all LilyPond Scheme extension functions.

\textit{ly:get-all-translators} \hspace{1em} \textbf{[Function]}

Return a list of all translator objects that may be instantiated.

\textit{get-bound-note-heads \textit{spanner}} \hspace{1em} \textbf{[Function]}

Take a spanner grob and return a pair containing all note heads of the initial starting and the final \textit{NoteColumn}.

\textit{ly:get-cff-offset \textit{font-file-name idx}} \hspace{1em} \textbf{[Function]}

Get the offset of the ‘CFF’ table for \textit{font-file-name}, returning it as an integer. The optional \textit{idx} argument is useful for OpenType/CFF collections (OTC) only; it specifies the font index within the OTC. The default value of \textit{idx} is 0.

\textit{get-chord-shape \textit{shape-code tuning base-chord-shapes}} \hspace{1em} \textbf{[Function]}

Return the chord shape associated with \textit{shape-code} and \textit{tuning} in the hash-table \textit{base-chord-shapes}.

\textit{ly:get-context-mods contextmod} \hspace{1em} \textbf{[Function]}

Returns the list of context modifications stored in \textit{contextmod}.

\textit{ly:get-font-format \textit{font-file-name idx}} \hspace{1em} \textbf{[Function]}

Get the font format for \textit{font-file-name}, returning it as a symbol. The optional \textit{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 \textit{idx} is 0.
ly:get-option var
   Get a global option setting.

get-postscript-bbox string
   Extract the bounding box from string, or return #f if not present.

ly:get-spacing-spec from-scm to-scm
   Return the spacing spec going between the two given grobs, from-scm and to-scm.

glyph-flag flag-style
   A callback for function default-flag to get a flag glyph.
   This function actually constructs a function returning a stencil, expecting a single argument, grob.
   It looks up glyph flags. StyleDirLog in the music font and uses it for the flag stencil. Style is the flag style based on flag-style (which can be empty), Dir is the flag direction (either 'u' or 'd'), and Log the duration log (an integer in the range 3 to 10) from which the number of flags attached to the stem is derived. Both Dir and Log are taken from grob. Example: flags.u3.
   If grob has the stroke-style property set, add a second glyph with the same glyph name components but use its value instead for log. Example: flags.ugrace.
   Not to be used with mensural flags, which have a slightly different naming scheme (see function mensural-flag).

ly:grob? x
   Is x a smob of class Grob?

grob::all-objects grob
   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.

grob::compose-function func data
   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 grob
   Display all objects stored in properties of grob grob.

grob::inherit-parent-property axis property default . . .
   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 grob
   Return the name of the grob grob as a symbol.

grob::offset-function func data rest . . .
   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 \texttt{func} accepts a grob and returns a value that is added to the value resulting from \texttt{data}. Optional argument \texttt{plus} defaults to ‘+’ but may be changed to allow for using a different underlying accumulation.

If \texttt{data} is \texttt{#f} or \texttt{()}, it is not included in the sum.

\begin{itemize}
\item \texttt{grob::relay-other-property \texttt{property}} \hspace{1cm} \textit{[Function]}
\quad \texttt{grob} callback generator for returning the value of another property, which is identified by the symbol \texttt{property}.
\item \texttt{grob::rhythmic-location \texttt{grob}} \hspace{1cm} \textit{[Function]}
\quad Return a pair consisting of the measure number and moment within the measure of \texttt{grob}.
\item \texttt{grob::unpure-Y-extent-from-stencil \texttt{pure-function}} \hspace{1cm} \textit{[Function]}
\quad The unpure height will come from a stencil whereas the pure height will come from \texttt{pure-function}.
\item \texttt{grob::when \texttt{grob}} \hspace{1cm} \textit{[Function]}
\quad Return the global timestep (a \texttt{Moment}) of \texttt{grob}.
\item \texttt{ly:grob-alist-chain \texttt{grob} \texttt{global}} \hspace{1cm} \textit{[Function]}
\quad Get an alist chain for \texttt{grob}, with \texttt{global} as the global default. If unspecified, there is no global default.
\item \texttt{ly:grob-array? \texttt{x}} \hspace{1cm} \textit{[Function]}
\quad Is \texttt{x} a smob of class \texttt{Grob_array}?
\item \texttt{ly:grob-array->list \texttt{grob-arr}} \hspace{1cm} \textit{[Function]}
\quad Return the elements of \texttt{grob-arr} as a Scheme list.
\item \texttt{ly:grob-array-length \texttt{grob-arr}} \hspace{1cm} \textit{[Function]}
\quad Return the length of \texttt{grob-arr}.
\item \texttt{ly:grob-array-ref \texttt{grob-arr} \texttt{index}} \hspace{1cm} \textit{[Function]}
\quad Retrieve the \texttt{index}th element of \texttt{grob-arr}.
\item \texttt{ly:grob-basic-properties \texttt{grob}} \hspace{1cm} \textit{[Function]}
\quad Get the immutable properties of \texttt{grob}.
\item \texttt{ly:grob-chain-callback \texttt{grob} \texttt{proc} \texttt{sym}} \hspace{1cm} \textit{[Function]}
\quad Find the callback that is stored as property \texttt{sym} of \texttt{grob} \texttt{grob} and chain \texttt{proc} to the head of this, meaning that it is called using \texttt{grob} and the previous callback’s result.
\item \texttt{ly:grob-common-refpoint \texttt{grob} \texttt{other} \texttt{axis}} \hspace{1cm} \textit{[Function]}
\quad Find the common refpoint of \texttt{grob} and \texttt{other} for \texttt{axis}.
\item \texttt{ly:grob-common-refpoint-of-array \texttt{grob} \texttt{others} \texttt{axis}} \hspace{1cm} \textit{[Function]}
\quad Find the common refpoint of \texttt{grob} and \texttt{others} (a grob-array) for \texttt{axis}.
\item \texttt{ly:grob-default-font \texttt{grob}} \hspace{1cm} \textit{[Function]}
\quad Return the default font for \texttt{grob}.
\item \texttt{ly:grob-extent \texttt{grob} \texttt{refp} \texttt{axis}} \hspace{1cm} \textit{[Function]}
\quad Get the extent in \texttt{axis} direction of \texttt{grob} relative to the \texttt{grob} \texttt{refp}.
\item \texttt{ly:grob-get-vertical-axis-group-index \texttt{grob}} \hspace{1cm} \textit{[Function]}
\quad Get the index of the vertical axis group the \texttt{grob} \texttt{grob} belongs to; return \texttt{-1} if none is found.
\end{itemize}
ly:grob-interfaces grob
Return the interfaces list of grob grob.

ly:grob-layout grob
Get \layout definition from grob grob.

ly:grob-list->grob-array grob-list
Convert a Scheme list of grobs to a grob array.

ly:grob-object grob sym val
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
Return the unbroken original grob of grob, grob may be an item or spanner.

ly:grob-parent grob axis def
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
Compare two grob priority queue entries. This is an internal function.

ly:grob-properties? x
Is x a smob of class Grob_properties?

ly:grob-property grob sym val
Return the value for property sym of grob. If no value is found, return val or '()' if val is not specified.

ly:grob-property-data grob sym
Return the value for property sym of grob, but do not process callbacks.

ly:grob-pure-height grob refp beg end val
Return the pure height of grob given refpoint refp. If no value is found, return val or '()' if val is not specified.

ly:grob-pure-property grob sym beg end val
Return the pure value for property sym of grob. If no value is found, return val or '()' if val is not specified.

ly:grob-pure-relative-coordinate grob refp start end
Return the pure vertical coordinate of grob relative to refp between start and end.

ly:grob-relative-coordinate grob refp axis
Get the coordinate in axis direction of grob relative to refp.

ly:grob-robust-relative-extent grob refp axis
Get the extent in axis direction of grob relative to the grob refp, or (0,0) if empty.

ly:grob-script-priority-less a b
Compare two grobs by script priority. For internal use.
ly:grob-set-nested-property! \textit{grob symlist val} \quad \text{[Function]}
\begin{itemize}
\item Set nested property \textit{symlist} in grob \textit{grob} to value \textit{val}.
\end{itemize}

ly:grob-set-object! \textit{grob sym val} \quad \text{[Function]}
\begin{itemize}
\item Set \textit{sym} in grob \textit{grob} to value \textit{val}.
\end{itemize}

ly:grob-set-parent! \textit{grob axis parent-grob} \quad \text{[Function]}
\begin{itemize}
\item Set \textit{parent-grob} as the parent of \textit{grob} in \textit{axis}.
\end{itemize}

ly:grob-set-property! \textit{grob sym val} \quad \text{[Function]}
\begin{itemize}
\item Set \textit{sym} in grob \textit{grob} to value \textit{val}.
\end{itemize}

ly:grob-spanned-column-rank-interval \textit{grob} \quad \text{[Function]}
\begin{itemize}
\item Return a pair with the rank of the furthest left column and the rank of the furthest right column spanned by \textit{grob}.
\end{itemize}

ly:grob-staff-position \textit{sg} \quad \text{[Function]}
\begin{itemize}
\item Return the y position of \textit{sg} relative to the staff.
\end{itemize}

ly:grob-suicide! \textit{grob} \quad \text{[Function]}
\begin{itemize}
\item Kill \textit{grob}.
\end{itemize}

ly:grob-system \textit{grob} \quad \text{[Function]}
\begin{itemize}
\item Return the system grob of \textit{grob}.
\end{itemize}

\textit{grob-transformer} \textit{property func} \quad \text{[Function]}
\begin{itemize}
\item Create an override value good for applying \textit{func} to either pure or unpure values. \textit{func} is called with the respective grob as first argument and the default value (after resolving all callbacks) as the second.
\end{itemize}

ly:grob-translate-axis! \textit{grob a d} \quad \text{[Function]}
\begin{itemize}
\item Translate \textit{grob} on axis \textit{a} over distance \textit{d}.
\end{itemize}

ly:grob-vertical<? \textit{a b} \quad \text{[Function]}
\begin{itemize}
\item Does \textit{a} lie above \textit{b} on the page?
\end{itemize}

\textbf{group-into-ranges} \textit{lst} \quad \text{[Function]}
\begin{itemize}
\item Turn a (possibly unsorted) list of integers into a sorted list of ranges, represented as pairs. For example:
\[
\text{(group-into-ranges '}(1\ 4\ 3\ 6\ 7\ 2)) \Rightarrow ((1\ .\ 4)\ (6\ .\ 7))
\]
\end{itemize}

\textbf{ly:gulp-file} \textit{filename [size]} \quad \text{[Function]}
\begin{itemize}
\item Same as \textbf{ly:gulp-file-utf8}, but decode the file as Latin 1. Warning: this is rarely what you want; consider using \textbf{ly:gulp-file-utf8} instead.
\end{itemize}

\textbf{ly:gulp-file-utf8} \textit{filename [size]} \quad \text{[Function]}
\begin{itemize}
\item Find a file on the search path (with \textbf{ly:find-file}), and return its contents decoded as UTF-8. Raise an error if the file is not found.
\end{itemize}
\begin{itemize}
\item If the optional argument \textit{size} is given, read at most \textit{size} characters (not bytes) from the file.
\end{itemize}

\textbf{ly:has-glyph-names?} \textit{font-file-name idx} \quad \text{[Function]}
\begin{itemize}
\item Does the font for \textit{font-file-name} have glyph names? The optional \textit{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 \textit{idx} is 0.
\end{itemize}

\textbf{ly:hash-table-keys} \textit{tab} \quad \text{[Function]}
\begin{itemize}
\item Return a list of keys in \textit{tab}.
\end{itemize}
headers-property-alist-chain headers
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 x y staff-space thick blot grob
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? ev cl
Does event ev belong to event class cl?

ly:inch num
num inches.

index-map f lsts ...
Applies f to corresponding elements of lists, just as map, providing an additional counter starting at zero. f needs to have the counter in its arguments. For example:

(index-map (lambda (i elt)
(format #f "-s is the element at index -a" elt i))
'(a b c d e))

ly:input-both-locations sip
Return input location in sip as
(file-name first-line first-column last-line last-column)

ly:input-file-line-char-column sip
Return input location in sip as (file-name line char column).

ly:input-location? x
Is x a smob of class Input?

ly:input-message sip msg rest
Print msg as a GNU compliant error message, pointing to the location in sip. msg is interpreted similar to format’s argument, using rest.

ly:input-warning sip msg rest
Print msg as a GNU compliant warning message, pointing to the location in sip. msg is interpreted similar to format’s argument, using rest.

int->bit-list n [pad-length]
Return the representation of n in binary, as a list of booleans.

If the optional argument pad-length is given, the list is padded with leading zeros to make it at least this long.

interpret-markup _ _ _
- LilyPond procedure: ly:text-interface::interpret-markup
Convert a text markup into a stencil. layout is a \layout block. props is an alist chain, i.e., a list of alists. markup is the markup text to be processed. See also grob-interpret-markup.

ly:interpret-music-expression mus ctx
Interpret the music expression mus in the global context ctx. The context is returned in its final state.
interval-center \( x \)
- Center the number pair \( x \), if an interval.

interval-index \( interval \ dir \)
- Interpolate \( interval \) between between left \( (dir=-1) \) and right \( (dir=+1) \).

interval-length \( x \)
- Length of the number pair \( x \), if an interval.

\[ \text{ly:intlog2} \ d \]
- The 2-logarithm of \( 1/d \).

invalidate-alterations \( context \)
- 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.

\[ \text{ly:item?} \ g \]
- Is \( g \) an Item object?

\[ \text{item::extra-spacing-height-including-staff} \ grob \]
- Return a value for extra-spacing-height that augments the extent of the grob to the extent of the staff.

\[ \text{ly:item-break-dir} \ it \]
- The break status direction of item \( it \). -1 means end of line, 0 unbroken, and 1 beginning of line.

\[ \text{ly:item-get-column} \ it \]
- Return the PaperColumn or NonMusicalPaperColumn associated with this Item.

\[ \text{ly:iterator?} \ x \]
- Is \( x \) a smob of class Music_iterator?

\[ \text{layout-line-thickness} \ grob \]
- Get the line thickness of the grob’s corresponding layout.

\[ \text{layout-set-absolute-staff-size} \ sz \]
- Set the absolute staff size inside of a \( \text{layout}{} \) block. \( sz \) is in points.

\[ \text{layout-set-staff-size} \ sz \]
- Set the staff size inside of a \( \text{layout}{} \) block. \( sz \) is in points.

\[ \text{left-align-at-split-notes} \ grob \]
- Left-align LyricText if the parent NoteHead is split by Completion_heads_ engraver

\[ \text{ly:length} \ x \ y \]
- 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.

\[ \text{ly:lily-lexer?} \ x \]
- Is \( x \) a smob of class Lily Lexer?

\[ \text{ly:lily-parser?} \ x \]
- Is \( x \) a smob of class Lily Parser?
lilypond-main files
Entry point for LilyPond.

lilypond-version-outdated? file-version lily-version
Is file-version outdated compared to lily-version? 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 unstable 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.

ly:line-interface::line grob startx starty endx endy
Make a line using layout information from grob grob.

list-insert-separator lst between
Create new list, inserting between elements of lst.

list-join lst intermediate
Put intermediate between all elements of lst.

list-pad-left lst len filler fillers ...
Same as list-pad-right, but add padding on the left.

list-pad-right lst len filler fillers ...
Pad lst on the right by appending elements until its length is at least len. The elements are taken from the variadic arguments. For example:

(list-pad-right '(a b c) 10 'd 'e)
⇒ (a b c d e d e d e)

ly:listened-event-class? disp cl
Does disp listen to any event type in the list cl?

ly:listened-event-types disp
Return a list of all event types that disp listens to.

ly:listener? x
Is x a smob of class Listener?

lookup-markup-command code
Return (function signature) for a markup command code, or return #f.

lyric-hyphen::vaticana-style grob
Draw a LyricHyphen grob as needed for Gregorian chant in Editio Vaticana style, that is, apply it once, flush-left. If the text property of LyricHyphen is set, print this markup. If the property is not set, use a hyphen character.

lyric-text::print grob
Allow interpretation of tildes as lyric tieing marks.

make-accidental-dodecaphonic-rule octaveness laziness
Variation on function make-accidental-rule that creates an dodecaphonic accidental rule.

make-accidental-rule octaveness laziness
Create an accidental rule that makes its decision based on the octave of the note and a laziness value.

octaveness 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.
laziness 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. #t is ‘forever’.

ly:make-book paper header scores
Make a \book of paper and header (which may be #f as well) containing \scores.

ly:make-book-part scores
Make a \bookpart containing \scores.

make-bow-stencil start stop thickness angularity bow-height orientation
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 fraction
Make markup for the ‘C’ time signature style.

make-circle-stencil radius thickness fill
Make a circle of radius radius and thickness thickness.

make-clef-set clef-name
Generate the clef setting commands for a clef named clef-name.

make-connected-line points grob
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 pointlist thickness x-scale y-scale connect fill
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
Create a context modification, optionally initialized via the list of modifications mod-list.

make-cue-clef-set clef-name
Generate the clef setting commands for a cue clef with name clef-name.

make-cue-clef-unset
Reset the clef settings for a cue clef.

ly:make-dispatcher
Return a newly created dispatcher.
ly:make-duration \texttt{length dotcount num den} \hspace{1cm} \textbf{[Function]}
Make a duration. \textit{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 \textit{dotcount}.

The duration factor is optionally given by integers \textit{num} and \textit{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.

\textit{make-duration-of-length \texttt{moment}} \hspace{1cm} \textbf{[Function]}
Make duration of the given \textit{moment} length.

\textit{make-ellipse-stencil \texttt{x-radius y-radius thickness fill}} \hspace{1cm} \textbf{[Function]}
Make an ellipse of \textit{x radius} \textit{x-radius}, \textit{y radius} \textit{y-radius}, and thickness \textit{thickness} with fill defined by \textit{fill}.

\textit{make-engraver \ldots} \hspace{1cm} \textbf{[Macro]}
Like \textit{make-translator}, but create an engraver, i.e., the resulting translator is only run in layout output and ignored in MIDI.

\textit{make-filled-box-stencil \texttt{xext yext}} \hspace{1cm} \textbf{[Function]}
Make a filled box.

\textit{ly:make-global-context \texttt{output-def}} \hspace{1cm} \textbf{[Function]}
Set up a global interpretation context, using the output block \textit{output-def}. The context is returned.

\textit{ly:make-global-translator \texttt{global}} \hspace{1cm} \textbf{[Function]}
Create a translator group and connect it to the global context \textit{global}. The translator group is returned.

\textit{make-glyph-time-signature-markup \texttt{style fraction}} \hspace{1cm} \textbf{[Function]}
Make markup for a symbolic time signature of the form \texttt{timesig.<style><numerator><denominator>}, for example \texttt{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.

\textit{ly:make-grob-properties \texttt{alist}} \hspace{1cm} \textbf{[Function]}
Package the given property list \textit{alist} in a grob property container stored in a context property with the name of a grob.

\textit{make-grob-property-overide \texttt{grob gprop val}} \hspace{1cm} \textbf{[Function]}
Make a Music expression that overrides \textit{gprop} to \textit{val} in \textit{grob}. This is a \texttt{\textbackslash temporary \textbackslash override}, making it possible to \texttt{\textbackslash revert} to any previous value afterwards.

\textit{make-grob-property-revert \texttt{grob gprop}} \hspace{1cm} \textbf{[Function]}
Revert the grob property \textit{gprop} for \textit{grob}.

\textit{make-grob-property-set \texttt{grob gprop val}} \hspace{1cm} \textbf{[Function]}
Make a Music expression that overrides a \textit{gprop} to \textit{val} in \textit{grob}. Does a pop first, i.e., this is not a \texttt{\textbackslash temporary \textbackslash override}.

\textit{make-harmonic \texttt{mus}} \hspace{1cm} \textbf{[Function]}
Convert music variable \textit{mus} to harmonics.
make-line-stencil width startx starty endx endy  [Function]
Make a line stencil of given line width and set its extents accordingly.

ly:make-listener callback  [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 around to scale  [Function]
Wrapper function for inverter-factory.

make-modal-transposer from to scale  [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 \( \text{props} \).
This function is for internal use and is only called by make-music, which is the preferred interface for creating music objects.

make-music name music-properties ...  [Function]
Create a music object of given name, and set its properties according to \( \text{music-properties} \), a list of alternating property symbols and values. Example:
\[
\text{(make-music 'OverrideProperty 'symbol 'Stem 'grob-property 'thickness 'grob-value (* 2 1.5))}
\]
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. \( \text{func} \) is the function, and \( \text{signature} \) describes its arguments. \( \text{signature} \)'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 \( \text{music} \) relative to \( \text{pitch} \), return final pitch.

ly:make-output-def  [Function]
Make an output definition.

make-oval-stencil x-radius y-radius thickness fill  [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 \textit{label}

Return page marker with label \textit{label}.

ly:make-page-permission-marker \textit{symbol} \textit{permission}

Return page marker with page breaking and turning permissions.

ly:make-paper-outputer \textit{port} \textit{alist} \textit{default-callback}

Create an outputter dumping to \textit{port}. \textit{alist} should map symbols to procedures. See file output-ps.scm for an example. If \textit{default-callback} is given, it is called for unsupported expressions.

make-part-combine-context-changes \textit{state-machine} \textit{split-list}

Generate a sequence of part combiner context changes from a split list.

make-part-combine-marks \textit{state-machine} \textit{split-list}

Generate a sequence of part combiner events from a split list.

make-partial-ellipse-stencil \textit{x-radius} \textit{y-radius} \textit{start-angle} \textit{end-angle} \textit{thick} \textit{connect} \textit{fill}

Create an elliptical arc. \textit{x-radius} is the x radius of the arc. \textit{y-radius} is the y radius of the arc. \textit{start-angle} is the starting angle of the arc (in degrees). \textit{end-angle} is the ending angle of the arc (in degrees). \textit{thick} is the thickness of the line. \textit{connect} is a boolean flag indicating whether the end should be connected to the start by a line. \textit{fill} is a boolean flag indicating whether the shape should be filled.

make-path-stencil \textit{path} \textit{thickness} \textit{x-scale} \textit{y-scale} \textit{fill} \#:\textit{line-cap-style} \#:\textit{line-join-style} \textit{line-join-style}

Make a stencil based on the path described by the list \textit{path}, with thickness \textit{thickness}, and scaled by \textit{x-scale} in the x direction and \textit{y-scale} in the y direction (the difference with scaling the resulting stencil using \texttt{ly:stencil-scale} is that this scaling does not change the thickness). \textit{fill} is a boolean argument that specifies whether the path should be filled. Valid path commands are

\begin{verbatim}
moveto rmoveto lineto rlineto curveto rcurveto closepath
\end{verbatim}

and their standard SVG single-letter equivalents

\begin{verbatim}
M m L l C c Z z
\end{verbatim}

make-performer \ldots

Like \texttt{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 \textit{octave} \textit{note} \textit{alter}

Make a pitch. \textit{octave} is specified by an integer, zero for the octave containing middle C. \textit{note} is a number indexing the global default scale, with 0 corresponding to pitch C and 6 usually corresponding to pitch B. Optional \textit{alter} is a rational number of 200-cent whole tones for alteration.

ly:make-prob \textit{type} \textit{init} \textit{rest}

Create a Prob object.

ly:make-rand-seed

Create seed value for initialization of a pseudo-random generator by combining output from a high-resolution clock with the current process id.
ly:make-regex pattern

Construct a new regular expression object.

Note that regular expressions created with this function are distinct from Guile native regular expressions (the latter don’t fully support Unicode). They should be used with ly:regex-... functions.

The full reference for the supported regular expression syntax can be read at https://www.pcre.org/original/doc/html/pcrepattern.html.

make-relative ...

The list of pitch or music variables in variables is (when inside of a \relative expression) first passed through the throwaway expression reference for the sake of adjusting the variables according to the needs of relative notation, and then is employed for constructing the returned expression music.

This should work well both inside and outside of \relative even when music function arguments get used multiple times and/or in different order in the resulting music expression.

Outside of \relative, the result just reflects plugging in the variables into music.

Inside of \relative, however, \relative is getting called on the reference expression (that is supposed to contain the variables just once and in the order and arrangement that results in a natural action of \relative on their values). After adjusting the octaves in the variables in that manner, the resulting expression music is constructed from them.

Any of the variables containing a pitch rather than a complete music expression is replaced with a simple note event for the purpose of plugging into reference and thus is also affected by \relative.

For \relative to have an effect on one of the variables, the reference expression must use the values of the variables without creating copies (i.e., only ‘#’ instead of ‘$’ on them inside of ‘#{...#}’ constructs). The reference expression will usually just be a sequential or chord expression naming all variables in sequence, implying that followup music will be relativized according to the resulting pitch of the last or first variable, respectively.

For constructing the resulting music however, the usual copying requirements for avoiding side effects from multiply used music function arguments and return values apply.

An example would be

\abba =
#(define-music-function (a b) (ly:music? ly:music?)
  (make-relative (a b)
    #{ #a #b #}
    #{ $a $b $b $a #}))

\relative {
  \abba c'\prime g'
}

make-repeat name times main alts

Create a repeat music expression, with all properties initialized properly.

ly:make-rotation angle center

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

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
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
Encapsulate music into a score smob.
This is a low-level function that does no preprocessing. You might be looking for function scorify-music instead, which also preprocesses music.

make-semitone->pitch pitches
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
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 buling 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
Make a spring. ideal is the ideal distance of the spring, and min-dist is the minimum distance.

ly:make-stencil expr xext yext
Stencils are device independent output expressions. They carry two pieces of information:
1. A specification of how to print this object. This specification is processed by the output backends, for example scm/output-ps.scm.
2. The vertical and horizontal extents of the object, given as pairs. If an extent is unspecified (or if you use empty-interval as its value), it is taken to be empty.

make-stencil-boxer thickness padding callback
Return function that adds a box around the grob passed as argument.

make-stencil-circler thickness padding callback
Return function that adds a circle around the grob passed as argument.

ly:make-stream-event cl proplist
Create a stream event of class cl with the given mutable property list.

make-tmpfile dir
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-tmpfile-name filename
Return filename, suffixed by a randomly generated, hexadecimal id.
ly:make-transform  xx yx xy yy x0 y0

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

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 ...

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 xext yext)  [Function]
```

Make a transparent box.

```
(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 function keys alist)  [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 map? music)  [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.

```
(mapped-up-headfoot what-odd what-even)  [Function]
```

Read variables what-odd and what-even from the page’s layout. Interpret either of them as header or footer markup, with properties reflecting the variables in the page’s layout and header modules.

```
(maped-up-title what)  [Function]
```

Read variable what from the page’s layout. Interpret it as title markup, with properties reflecting the variable in the page’s layout and header modules.

```
(markup ...)
```

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 m #: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.
Chapter 4: Scheme functions

**Function**

`markup-command-list? x`

Check whether `x` is a markup command list, i.e., a list composed of a markup list function and its arguments.

**Function**

`markup-default-to-string-method layout props args ...`

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.

**Macro**

`markup-lambda ...`

Defines and returns an anonymous markup command. Other than not registering the markup command, this is identical to `define-markup-command`.

**Function**

`markup-list? arg`

Return a true value if `x` is a list of markups or markup command lists.

**Macro**

`markup-list-lambda ...`

Same as `markup-lambda` but defines a markup list command that, when interpreted, returns a list of stencils instead of a single one.

**Function**

`matrix-rotate-counterclockwise matrix`

Return a copy of `matrix` rotated counterclockwise. `matrix` is a 2-dimensional array without non-zero lower bounds in its shape.

**Function**

`measure-counter::text grob`

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.

**Function**

`mensural-flag grob`

A callback for function `default-flag` to get a mensural flag. Mensural flags are aligned with staff lines; for stems ending on staff lines, use different flags than for notes between staff lines. The idea is that the inner end of a flag always touches a staff line.

The mensural flag glyph is taken from the music font; its name is `flags.mensuralDirTypeLog`. `Dir` is the flag direction (either ‘u’ or ‘d’), `Type` is ‘0’ if the note head is between staff lines and ‘1’ otherwise, `Log` is the duration log (an integer in the range 3 to 6) from which the number of flags attached to the stem is derived. Both `Dir` and `Log` are taken from `grob`. Example: `flags.mensuralu13`.

This function returns a stencil.

**Function**

`ly:message str rest`

A Scheme callable function to issue the message `str`. The message is formatted with `format`; `rest` holds the formatting arguments (if any).

**Function**

`middle-broken-spanner? spanner`

Is `spanner` broken and among the middle broken pieces (i.e., neither the first nor the last)?

**Function**

`midi-program instrument`

Return the program of the instrument.

**Function**

`ly:minimal-breaking paper-book`

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.
\textbf{minmax/cmp} \textit{cmp} arg args ... \textit{[Function]}

Like \texttt{min} or \texttt{max}, but applies to any type of values, comparing them with \texttt{cmp} instead of \texttt{<} or \texttt{>}. For example:

\begin{verbatim}
(minmax/cmp (comparator-from-key string-length <) "a" "aa" "aaa")
⇒ "a"
(minmax/cmp (comparator-from-key string-length >) "a" "aa" "aaa")
⇒ "aaa"
\end{verbatim}

\textbf{ly:mm} \textit{num}

\begin{verbatim}
num mm.
\end{verbatim}

\textbf{mmrest-of-length} \textit{mus}

Create a multi-measure rest of exactly the same length as \textit{mus}.

\textbf{modern-straight-flag} \textit{grob}

A callback function for Flag.stencil to get a modern straight flag.

This is used by composers like Stockhausen or Boulez.

The straight flag angles are 18 and 22 degrees for up-stems and down-stems, respectively, and thus smaller than for \texttt{old-straight-flag}. If the caller sets the stroke-style property of \textit{grob} to the string "grace", add a slash through the flag.

This function returns a stencil.

\textbf{ly:module->alist} \textit{mod}

Dump the contents of module \textit{mod} as an alist.

\textbf{ly:module-copy} \textit{dest src}

Copy all bindings from module \textit{src} into \textit{dest}.

\textbf{ly:modules-lookup} \textit{modules sym def}

Look up \textit{sym} in the list \textit{modules}, returning the first occurrence. If not found, return \textit{def} or \#f if \textit{def} isn’t specified.

\textbf{ly:moment?} \textit{x}

Is \textit{x} a smob of class \texttt{Moment}?

\textbf{ly:moment<?} \textit{a b}

Compare two moments.

\textbf{ly:moment-add} \textit{a b}

Add two moments.

\textbf{ly:moment-div} \textit{a b}

Divide moment \textit{a} by a number \textit{b} (or by the main part of another moment).

\textbf{ly:moment-grace} \textit{mom}

Extract grace timing as a rational number from \textit{mom}.

\textbf{ly:moment-grace-denominator} \textit{mom}

Extract denominator from grace timing.

\textbf{ly:moment-grace-numerator} \textit{mom}

Extract numerator from grace timing.

\textbf{ly:moment-main} \textit{mom}

Extract main timing as a rational number from \textit{mom}.
ly:moment-main-denominator \textit{mom} \[\text{Function}\]
Extract denominator from main timing.

ly:moment-main-numerator \textit{mom} \[\text{Function}\]
Extract numerator from main timing.

ly:moment-mod \textit{a} \textit{b} \[\text{Function}\]
Modulo of two moments.

ly:moment-mul \textit{a} \textit{b} \[\text{Function}\]
Multiply moment \textit{a} by a number \textit{b} (or by the main part of another moment).

ly:moment-sub \textit{a} \textit{b} \[\text{Function}\]
Subtract two moments.

ly:music? \textit{obj} \[\text{Function}\]
Is \textit{obj} a Music object?

music->make-music \textit{obj} \[\text{Function}\]
Generate an expression that, once evaluated, may return an object equivalent to \textit{obj}, that is, for a music expression, a (make-music ...) form.

music-clone \textit{music} \textit{music-properties} \ldots \[\text{Function}\]
Clone \textit{music} and set properties according to \textit{music-properties}, a list of alternating property symbols and values:

\begin{verbatim}
  (music-clone start-span 'span-direction STOP)
\end{verbatim}

Only properties that are not overridden by \textit{music-properties} are actually fully cloned.

ly:music-compress \textit{mus} \textit{scale} \[\text{Function}\]
Compress \textit{mus} by \textit{scale}.

ly:music-deep-copy \textit{m} \textit{origin} \[\text{Function}\]
Copy \textit{m} and all sub expressions of \textit{m}. \textit{m} may be an arbitrary type; cons cells and music are copied recursively. If \textit{origin} is given, it is used as the origin for one level of music by calling \textit{ly:set-origin!} on the copy.

ly:music-duration-compress \textit{mus} \textit{fact} \[\text{Function}\]
Compress \textit{mus} by factor \textit{fact}, which is a Moment.

ly:music-duration-length \textit{mus} \[\text{Function}\]
Extract the duration field from \textit{mus} and return the length.

music-filter \textit{pred?} \textit{music} \[\text{Function}\]
Filter out music expressions that do not satisfy \textit{pred?}.

ly:music-function? \textit{x} \[\text{Function}\]
Is \textit{x} a smob of class Music_function?

ly:music-function-extract \textit{x} \[\text{Function}\]
Return the Scheme function inside \textit{x}.

ly:music-function-signature \textit{x} \[\text{Function}\]
Return the function signature inside \textit{x}.

music-is-of-type? \textit{mus} \textit{type} \[\text{Function}\]
Does \textit{mus} belong to the music class \textit{type}?
ly:music-length \textit{mus}

Get the length of music expression \textit{mus} and return it as a \textit{Moment} object.

ly:music-list? \textit{lst}

Is \textit{lst} a list of music objects?

\begin{description}
\item[\textbf{music-map} \textit{function} \textit{music}]
\end{description}

Apply \textit{function} to \textit{music} and all of the music it contains.

First it recurses over the children, then the function is applied to \textit{music}.

ly:music-mutable-properties \textit{mus}

Return an alist containing the mutable properties of \textit{mus}. The immutable properties are not available, since they are constant and initialized by the \texttt{make-music} function.

ly:music-output? \textit{x}

Is \textit{x} a smob of class \texttt{Music_output}?

\begin{description}
\item[\textbf{music-pitches} \textit{music}]
\end{description}

Return a list of all pitches from \textit{music}.

ly:music-property \textit{mus} \textit{sym} \textit{val}

Return the value for property \textit{sym} of music expression \textit{mus}. If no value is found, return \textit{val} or '()' if \textit{val} is not specified.

\begin{description}
\item[\textbf{music-selective-filter} \textit{descend}? \textit{pred}? \textit{music}]
\end{description}

Recursively filter out music expressions that do not satisfy \textit{pred}?, but refrain from filtering the subexpressions of music that does not satisfy \textit{descend}?

\begin{description}
\item[\textbf{music-selective-map} \textit{descend}? \textit{function} \textit{music}]
\end{description}

Apply \textit{function} recursively to \textit{music}, but refrain from mapping subexpressions of music that does not satisfy \textit{descend}?

music-separator? \textit{m}

Is \textit{m} a separator?

ly:music-set-property! \textit{mus} \textit{sym} \textit{val}

Set property \textit{sym} in music expression \textit{mus} to \textit{val}.

ly:music-start \textit{mus}

Get the start of music expression \textit{mus} and return it as a \textit{Moment} object.

ly:music-transpose \textit{m} \textit{p}

Transpose \textit{m} such that central C is mapped to \textit{p}. Return \textit{m}.

\begin{description}
\item[\textbf{music-type-predicate} \textit{types}]
\end{description}

Return a predicate function that can be used for checking music to have one of the types listed in \textit{types}.

\begin{description}
\item[\textbf{neo-modern-accidental-rule} \textit{context} \textit{pitch} \textit{barnum}]
\end{description}

An accidental rule that typesets an accidental if it differs from the key signature and 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.

\begin{description}
\item[\textbf{no-flag} \textit{grob}]
\end{description}

A callback for function \texttt{default-flag}, indicating ‘no flag’.

This function simply returns an empty stencil.
Chapter 4: Scheme functions

ly:non-fatal-error str rest
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 grob
A callback for function default-flag to get a ‘normal’ flag.
See function glyph-flag for the naming scheme of flag glyphs (with argument flag-style set to the empty string).
This function returns a stencil.

normalize-color color
Convert a color given in any of the supported formats into a list of 4 numbers: R, G, B, A. Possible formats are: such a list of 4 numbers; a list of 3 numbers (transparency defaults to 1.0); a CSS string (named color, or “#RRGGBB”, or “#RRGGBBAA”, or “#RGB”, or “#RGBA”).

not-first-broken-spanner? spanner
Is spanner broken and not the first of its broken siblings? The name is read “(not first) and broken”.

not-last-broken-spanner? spanner
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
Return the AccidentalPlacement grob from note-column if any, or SCM_EOL otherwise.

ly:note-column-dot-column note-column
Return the DotColumn grob from note-column if any, or SCM_EOL otherwise.

ly:note-extra-source-file filename parser
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.
In general, this function can embed arbitrary files into LilyPond’s PDF output (using embedded file streams).

ly:note-head::stem-attachment font-metric glyph-name direction
Get attachment in font-metric for attaching a stem to notehead glyph-name in the direction direction (default UP).

note-name->markup pitch lowercase?
Return pitch markup for pitch, including accidentals printed as glyphs. If lowercase? is set to #f, the note names are capitalized.

note-name->string pitch language ...
Return pitch string for pitch, without accidentals or octaves. Current input language is used for pitch names, except if an other language is specified.

ly:note-scale? x
Is x a smob of class Scale?

note-to-cluster music
Replace NoteEvents by ClusterNoteEvents.
ly: number->string s
    Convert s to a string without generating many decimals.

number-format number-type num custom-format ...
    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 fret-offset diagram-definition
    Add fret-offset to each fret indication in diagram-definition and return the resulting verbose fret-diagram-definition.

offsetter property offsets
    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 grob
    A callback function for Flag.stencil to get an old straight flag.
    This is used by composers like Bach.
    The up-stem and down-stem angles of the flags are both 45 degrees. If the caller sets the stroke-style property of grob to the string "grace", add a slash through the flag.
    This function returns a stencil.

    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
    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
    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
    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
    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
    Convert the contents of an OTF file to a CFF file, returning it as a string. The optional idx argument is useful for OpenType/CFF collections (OTC) only; it specifies the font index within the OTC. The default value of idx is 0.

ly: otf-font? font
    Is font an OpenType font?

ly: otf-font-glyph-info font glyph
    Given the font metric font of an OpenType font, return the information about named glyph glyph (a string).
ly:otf-font-table-data font tag
Extract a table tag from font. Return empty string for non-existent tag.

ly:otf-glyph-count font
Return the number of glyphs in font.

ly:otf-glyph-list font
Return a list of glyph names for font.

ly:output-def? x
Is x a smoof of class Output_def?

ly:output-def-clone def
Clone output definition def.

ly:output-def-lookup def sym val
Return the value of sym in output definition def (e.g., \paper). If no value is found, return val or '()' if val is undefined.

ly:output-def-parent output-def default-value
Return the parent output definition of output-def, or default-value if output-def has no parent. default-value is optional, and defaults to '().

ly:output-def-scope def
Return the variable scope inside def.

ly:output-def-set-variable! def sym val
Set an output definition def variable sym to val.

ly:output-description output-def
Return the description of translators in output-def.

ly:output-file-name-for-input-file-name name
Convert the name of an input file (as provided on the command line) to the name of an output file without an extension, honoring command-line options such as --output and -dstrip-output-dir.

ly:output-find-context-def output-def context-name
Return an alist of all context defs (matching context-name if given) in output-def.

output-module? module
Return #t if module belongs to an output module usually carrying context definitions (\midi or \layout).

ly:outputter-close outputter
Close port of outputter.

ly:outputter-dump-stencil outputter stencil
Dump stencil expr onto outputter.

ly:outputter-dump-string outputter str
Dump str onto outputter.

ly:outputter-output-scheme outputter expr
Output expr to the paper outputter.

ly:outputter-port outputter
Return output port for outputter.
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oval-stencil stencil thickness x-padding y-padding
Add an oval around stencil, padded by the padding pair, producing a new stencil.

override-head-style heads style
Override style for heads to style.

override-time-signature-setting time-signature setting
Override the time signature settings for the context in time-signature, with the new setting alist setting.

ly:page-marker? x
Is x a smob of class Page_marker?

ly:page-turn-breaking paper-book
Optimally break (pages and lines) the Paper_book object paper-book such that page turns only happen in specified places, returning its pages.

ly:pango-font? f
Is f a Pango font?

ly:pango-font-physical-fonts f
Return alist of (ps-name file-name font-index) lists for Pango font f.

pango-pf-file-name pango-pf
Return the file name of the Pango physical font pango-pf.

pango-pf-font-name pango-pf
Return the font name of the Pango physical font pango-pf.

pango-pf-font-index pango-pf
Return the font index of the Pango physical font pango-pf.

ly:paper-book? x
Is x a smob of class Paper_book?

ly:paper-book-header pb
Return the header definition (\header) in Paper_book object pb.

ly:paper-book-pages pb

ly:paper-book-paper pb
Return the paper output definition (\paper) in Paper_book object pb.

ly:paper-book-performances pb

ly:paper-book-scopes pb

ly:paper-book-systems pb

ly:paper-column::break-align-width col align-syms
col 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 `align-sym`, which is either a break align symbol (see the `break-align-symbol` property), or a list of such symbols. For example,

```
(ly:paper-column::break-align-width col '(key-signature staff-bar))
```

tries to find a BreakAlignGroup of key signatures, but falls back on bar lines if there are no key signatures or if the extent of the BreakAlignGroup containing them is empty (for example, if they are omitted).

The special symbol `break-alignment` 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.

**ly:paper-column::print**

Optional stencil for PaperColumn or NonMusicalPaperColumn. Draws the rank number of each column, its moment in time, a blue arrow showing the ideal distance, and a red arrow showing the minimum distance between columns.

**ly:paper-fonts def**

Return a list containing the fonts from output definition `def` (e.g., `\paper`).

**ly:paper-get-font def chain**

Find a font metric in output definition `def` satisfying the font qualifiers in alist chain `chain`, and return it. (An alist chain is a list of alists, containing grob properties.)

**ly:paper-get-number def sym**

Return the value of variable `sym` in output definition `def` as a double.

**ly:paper-outputscale def**

Return the output-scale for output definition `def`.

**ly:paper-score-paper-systems paper-score**

Return vector of paper_system objects from `paper-score`.

**ly:paper-system? obj**

Is `obj` a C++ Prob object of type paper-system?

**parenthesize-stencil stencil half-thickness width angularity padding**

Add parentheses around `stencil`, returning a new stencil.

**ly:parse-file name**


**ly:parse-init name**

Parse the init file `name`.

**ly:parse-string-expression parser-smob ly-code filename line**

Parse the string `ly-code` with `parser-smob`. Return the contained music expression. `filename` and `line` are optional source indicators.

**parse-terse-string terse-definition**

Parse a fret-diagram-terse definition string `terse-definition` and return a marking list, which can be used with a fretboard grob.

**ly:parsed-undead-list!**

Return the list of objects that have been found alive but should have been dead, and clear that list.
Chapter 4: Scheme functions

ly:parser-clear-error parser
   Clear error flag for parser, defaulting to current parser.

ly:parser-clone closures location
   Return a clone of current parser. An association list of port positions to closures can be
   specified in closures in order to have \$ and \# interpreted in their original lexical environment.
   If location is a valid location, it becomes the source of all music expressions inside.

ly:parser-define! symbol val
   Bind symbol to val in current parser’s module.

ly:parser-error msg input
   Display an error message and make current parser fail. Without a current parser, trigger an
   ordinary error.

ly:parser-has-error? parser
   Does parser (defaulting to current parser) have an error flag?

ly:parser-include-string ly-code
   Include the string ly-code into the input stream for current parser. Can only be used in
   immediate Scheme expressions (\$ instead of \#).

ly:parser-lookup symbol
   Look up symbol in current parser’s module. Return ’() if not defined.

ly:parser-output-name parser
   Return the base name of the output file. If parser is left off, use currently active parser.

ly:parser-parse-string parser-smob ly-code
   Parse the string ly-code with parser-smob. Upon failure, throw ly-file-failed key.

ly:parser-set-note-names names
   Replace current note names in parser. names is an alist of symbols. This only has effect if
   the current mode is notes.

percussion? instrument
   Return #t if the instrument should use MIDI channel 9.

ly:perform-text-replacements props input-string
   A string transformer to perform text replacements using the replacement-alist from the
   property alist chain props.

ly:performance-headers performance
   Return the list of headers with the innermost first.

ly:performance-write performance filename name
   Write performance to filename storing name as the name of the performance in the file
   metadata.

ly:pitch? x
   Is x a smob of class Pitch?

ly:pitch<? p1 p2
   Is p1 lexicographically smaller than p2?

ly:pitch-alteration pp
   Extract the alteration from pitch pp.
ly:pitch-diff pitch root
   Return pitch delta such that root transposed by delta equals pitch.

ly:pitch-negate p
   Negate pitch p.

ly:pitch-notename pp
   Extract the note name from pitch pp.

ly:pitch-octave pp
   Extract the octave from pitch pp.

ly:pitch-quartertones pp
   Calculate the number of quarter tones of pitch pp from middle C.

ly:pitch-semitones pp
   Calculate the number of semitones of pitch pp from middle C.

ly:pitch-steps p
   Number of steps counted from middle C of the pitch p.

ly:pitch-tones pp
   Calculate the number of tones of pitch pp from middle C as a rational number.

ly:pitch-transpose p delta
   Transpose pitch p by the amount delta, where delta is relative to middle C.

ly:png->eps-dump file-name port r g b a
   Read the PNG image under file-name and convert it to EPS data, dumping the output onto port. r, g, b and a are the components of the background color.

ly:png-dimensions file-name
   Read the PNG image under file-name and return its dimensions as a pair of integers, or #f if there was an error (a warning is printed in this case).

ly:pointer-group-interface::add-grob grob sym grob-element
   Add grob-element to grob’s sym grob array.

polar->rectangular radius angle-in-degrees
   Return polar coordinates (radius, angle-in-degrees) as rectangular coordinates (x-length, y-length).

ly:position-on-line? sg spos
   Return whether spos is on a line of the staff associated with the grob sg (even on an extender line).

prepend-alist-chain key val chain
   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
   Is x a smob of class Prob?

ly:prob-immutable-properties prob
   Retrieve an alist of immutable properties.

ly:prob-mutable-properties prob
   Retrieve an alist of mutable properties.
ly:prob-property  \textit{prob} \textit{sym} \textit{val} \quad \text{[Function]}
\begin{itemize}
  \item Return the value for property \textit{sym} of \textit{Prob} object \textit{prob}. If no value is found, return \textit{val} or \textit{'}()\textit{ if \textit{val} is not specified.}
\end{itemize}

ly:prob-property? \textit{obj} \textit{sym} \quad \text{[Function]}
\begin{itemize}
  \item Is boolean prop \textit{sym} of \textit{obj} set?
\end{itemize}

ly:prob-set-property! \textit{obj} \textit{sym} \textit{value} \quad \text{[Function]}
\begin{itemize}
  \item Set property \textit{sym} of \textit{obj} to \textit{value}.
\end{itemize}

ly:prob-type? \textit{obj} \textit{type} \quad \text{[Function]}
\begin{itemize}
  \item Is \textit{obj} the specified prob type?
\end{itemize}

ly:programming-error \textit{str} \textit{rest} \quad \text{[Function]}
\begin{itemize}
  \item A Scheme callable function to issue the internal warning \textit{str}. The message is formatted with \texttt{format}; \textit{rest} holds the formatting arguments (if any).
\end{itemize}

ly:progress \textit{str} \textit{rest} \quad \text{[Function]}
\begin{itemize}
  \item A Scheme callable function to print progress \textit{str}. The message is formatted with \texttt{format}; \textit{rest} holds the formatting arguments (if any).
\end{itemize}

ly:property-lookup-stats \textit{sym} \quad \text{[Function]}
\begin{itemize}
  \item Return hash table with a property access corresponding to \textit{sym}. Choices are \textit{prob}, \textit{grob}, and \textit{context}.
\end{itemize}

ly:pt \textit{num} \quad \text{[Function]}
\begin{itemize}
  \item \textit{num} printer points.
\end{itemize}

ly:pure-call \textit{data} \textit{grob} \textit{start} \textit{end} \textit{rest} \quad \text{[Function]}
\begin{itemize}
  \item Convert property \textit{data} (unpure-pure container or procedure) to value in a pure context defined by \textit{grob}, \textit{start}, \textit{end}, and possibly \textit{rest} arguments.
\end{itemize}

pure-chain-offset-callback \textit{grob} \textit{start} \textit{end} \textit{prev-offset} \quad \text{[Function]}
\begin{itemize}
  \item 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.
\end{itemize}

ratio->fret \textit{ratio} \quad \text{[Function]}
\begin{itemize}
  \item Calculate a fret number given \textit{ratio} for the harmonic.
\end{itemize}

ratio->pitch \textit{ratio} \quad \text{[Function]}
\begin{itemize}
  \item Calculate a pitch given \textit{ratio} for the harmonic.
\end{itemize}

read-lily-expression \textit{chr} \textit{port} \quad \text{[Function]}
\begin{itemize}
  \item Read a lilypond music expression enclosed within \#\{ and \#\} from \textit{port} and return the corresponding Scheme music expression. ‘$’ and ‘#’ introduce immediate and normal Scheme forms.
\end{itemize}

recording-group-emulate \textit{music} \textit{odef} \quad \text{[Function]}
\begin{itemize}
  \item Interpret \textit{music} according to \textit{odef}, but store all events in a chronological list, similar to the \texttt{Recording}\_\texttt{group}\_\texttt{engraver} in LilyPond version 2.8 and earlier.
\end{itemize}

ly:regex? \textit{x} \quad \text{[Function]}
\begin{itemize}
  \item Is \textit{x} a smob of class \texttt{Regex}?\end{itemize}
ly:regex-exec regex string

Scan string for a match of the regular expression object regex (constructed with ly:make-regex). Return a match object or #f. See ly:regex-match-... functions for what you can do with the match object.

For example, this extracts the components of a date in YYYY-MM-DD format:

```scheme
#(define date-components
  (let ((date-regex (ly:make-regex "-(\d{4})-(\d{2})-(\d{2})$")))
    (lambda (date)
      (let ((match (ly:regex-exec date-regex date)))
        (if match
            (list (string->number (ly:regex-match-substring match 1))
                  (string->number (ly:regex-match-substring match 2))
                  (string->number (ly:regex-match-substring match 3)))
            (error "not a date"))))))
```

ly:regex-exec->list regex string

Like ly:regex-exec, but return a list of non-overlapping matches instead of the first match only."

ly:regex-match? x

Is x a regular expression match object?

ly:regex-match-positions match [index]

Retrieve the start and end of a capturing group in a regular expression match object, returned as a pair, or #f. See ly:regex-match-substring for details. The index argument is optional, defaulting to 0.

ly:regex-match-prefix m

Retrieve the part of the target string before the regex match m.

ly:regex-match-substring m [index]

Retrieve the substring matched by a specific capturing group in the match object match. index should be 1 for the first group, 2 for the second group, etc. index defaults to 0, which returns the substring matched by the entire regular expression. If the capturing group was not part of the match (e.g., group 2 when matching aa against the regex (a+)|(b+)), #f is returned.

ly:regex-match-suffix m

Retrieve the part of the target string after the regex match m.

ly:regex-quote string

Escape special characters in string, forming a regular expression pattern that matches exactly string.

Example:

```scheme
(ly:regex-quote "$2")
⇒ "\\$2"
```

ly:regex-replace regex string replacements

Scan for matches of the compiled regular expression regex (created with ly:make-regex) in the string string, and form a new string by replacing them according to the replacements. Each replacement argument can be:

- A string, which is output as-is.
- A non-negative integer, which is interpreted as a match substring index (see ly:regex-match-substring).
A procedure, which is called on the match object, and should return a string.

This example converts a date from YYYY-MM-DD format to DD-MM-YYYY format:

```scheme
#(define date-yyyy-mm-dd->dd-mm-yyyy
  (let ((date-regex (ly:make-regex "(\d{4})-(\d{2})-(\d{2})")))
    (lambda (date)
      (ly:regex-replace date-regex date 3 "-" 2 "-" 1)))))
```

This example does the same, using a procedure:

```scheme
#(define date-yyyy-mm-dd->dd-mm-yyyy
  (let ((date-regex (ly:make-regex "(\d{4})-(\d{2})-(\d{2})")))
    (lambda (date)
      (ly:regex-replace
       date-regex
       date
       (lambda (match)
         (format #f "-a--a--a"
                 (ly:regex-match-substring match 3)
                 (ly:regex-match-substring match 2)
                 (ly:regex-match-substring match 1)))))))
```

**ly:regex-split** regex str
Split str into non-overlapping occurrences of the regex regex, returning a list of the substrings.

**ly:register-stencil-expression** symbol
Add symbol as head of a stencil expression.

**ly:register-translator** creator name description
Register a translator creator (usually a descriptive alist or a function/closure returning one when given a context argument) with the given symbol name and the given description alist.

**ly:relative-group-extent** elements common axis
Determine the extent of elements relative to common in the axis direction.

**remove-grace-property** context-name grob sym
Remove all sym for grob in context-name.

**remove-whitespace** strg
Remove characters satisfying char-whitespace? from string strg.

**ly:rename-file** oldname newname
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**
Forget all about previously loaded fonts.

**ly:reset-options** alist
Reset all program options to the values in alist.

**retrieve-glyph-flag** flag-style dir dir-modifier grob
Load the correct flag glyph from the music font.
This is an auxiliary function for create-glyph-flag.

**retrograde-music** music
Return music in retrograde (reversed) order.
revert-fontSize \textit{func-name} \textit{mag}  

Used by \texttt{\textbackslash magnifyMusic} and \texttt{\textbackslash magnifyStaff}. Calculate the previous fontSize value (before scaling) by factoring out the magnification factor \textit{mag} (if \textit{func-name} is 'magnifyMusic'), or by factoring out the context property \texttt{magnifyStaffValue} (if \textit{func-name} is 'magnifyStaff'). Revert the fontSize in the appropriate context accordingly.

With \texttt{\textbackslash magnifyMusic}, the scaling is reverted after the music block it operates on. \texttt{\textbackslash 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 \textit{heads}  
Revert style for \textit{heads}.

revert-props \textit{func-name} \textit{mag} \textit{props}  

Used by \texttt{\textbackslash magnifyMusic} and \texttt{\textbackslash magnifyStaff}. Revert each prop in \textit{props} in the appropriate context. \textit{func-name} is either 'magnifyMusic or 'magnifyStaff. The \textit{props} list is formatted like:

'((Stem thickness)  
(Slur line-thickness)  
...)

\texttt{ly:round-filled-box} \textit{xext} \textit{yext} \textit{blot}  

Make a Stencil object that prints a black box of dimensions \textit{xext}, \textit{yext} and roundness \textit{blot}.

\texttt{ly:round-polygon} \textit{points} \textit{blot} \textit{extroversion} \textit{filled}  

Make a Stencil object that prints a polygon with corners at the points defined by \textit{points} (a list of coordinate pairs) and roundness \textit{blot}. Optional numeric argument \textit{extroversion} shifts the outline outward, with the default of 0 keeping the middle of the line just on the polygon. If optional Boolean argument \textit{filled} is set to \texttt{#t} (which is the default), fill the polygon.

rounded-box-stencil \textit{stencil} \textit{thickness} \textit{padding} \textit{blot}  

Add a rounded box around \textit{stencil}, producing a new stencil.

\texttt{ly:run-translator} \textit{mus} \textit{output-def}  

Process \textit{mus} according to \textit{output-def}. An interpretation context is set up, and \textit{mus} is interpreted with it. The context is returned in its final state.

scale-beam-thickness \textit{mag}  

Used by \texttt{\textbackslash magnifyMusic}. Scaling Beam.beam-thickness exactly to the \textit{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 \texttt{\textbackslash temporary \textbackslash override} with the new value.

scale-fontSize \textit{func-name} \textit{mag}  

Used by \texttt{\textbackslash magnifyMusic} and \texttt{\textbackslash magnifyStaff}. Look up the current fontSize in the appropriate context and scale it by the magnification factor \textit{mag}. \textit{func-name} is either 'magnifyMusic or 'magnifyStaff.

scale-layout \textit{paper} \textit{scale}  

Return a clone of \textit{paper}, scaled by the given scale factor.

scale-props \textit{func-name} \textit{mag} \textit{allowed-to-shrink?} \textit{props}  

Used by \texttt{\textbackslash magnifyMusic} and \texttt{\textbackslash magnifyStaff}. For each prop in \textit{props}, find the current value of the requested prop, scale it by the magnification factor \textit{mag}, and do the equivalent of a \texttt{\textbackslash temporary \textbackslash override} with the new value in the appropriate context. If \textit{allowed-to-shrink?} is \texttt{#f}, don't let the new value be less than the current value. \textit{func-name} is either 'magnifyMusic or 'magnifyStaff. The \textit{props} list is formatted like:

'((Stem thickness)
(Slur line-thickness)
...)

ly:score? x
Is x a smob of class Score?

ly:score-add-output-def! score def
Add an output definition def to score.

ly:score-embedded-format score layout
Run score through layout (an output definition) scaled to correct output-scale already,
returning a list of layout lines.

ly:score-error? score
Was there an error in the score?

ly:score-header score
Return score header.

ly:score-music score
Return score music.

ly:score-output-defs score
All output definitions in a score.

ly:score-set-header! score module
Set the score header.

scorify-music music
Preprocess music and encapsulate it into a score smob.
Among other things, preprocessing replaces chord repetitions via ‘q’ with the correct actual
chords.

seconds->moment s context
Return a moment equivalent to s seconds at the current tempo.

select-head-glyph style log
Select a note head glyph string based on note head style style and duration log log.

self-alignment-interface::self-aligned-on-breakable grob
Return the X-offset that places grob 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.

sequential-music-to-chord-exceptions seq rest ...
Transform sequential music seq of type
<<c d e>-
\markup{ foobar } \)
to (cons cde-pitches foobar-markup), or to (cons de-pitches foobar-markup) if omit-
root is given and non-false.

set-accidental-style style rest ...
Set accidental style to style. 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.
set-default-paper-size name rest...

Set the default paper size to name with orientation rest.

name is either a predefined paper size string like "quarto" or a pair of numbers like '(cons (* 100 mm) (* 50 mm))' to specify a custom paper size.

If optional argument rest is set to 'landscape, pages are rotated by 90 degrees, and wider line widths are set accordingly. Swapping the paper dimensions without having the print rotated can be achieved by appending the string landscape to the name of the paper size itself (example: "a4landscape").

This function can only be used at top level; it must come before any \paper block. See also function set-paper-size.

ly:set-default-scale scale

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 sz

Set the default staff size, where sz is thought to be in points.

ly:set-grob-creation-callback cb

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

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

Set the middleCPosition variable in context based on the variables middleCClefPosition and middleCOffset.

set-mus-properties! m alist

Set all of alist as properties of m.

ly:set-option var val

Set program option var to value val.

See also function ly:add-option.

ly:set-origin! m origin

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  grob-name  symbol  val  
Usage example: \applyoutput  #(set-output-property 'Clef 'extra-offset '(0 . 1))

set-paper-size  name  rest  ...
Set the paper size within \paper  to  name  with orientation  rest.
name  is either a predefined paper size string like "quarto" or a pair of numbers like '(cons (* 100 mm) (* 50 mm)) to specify a custom paper size.
If optional argument  rest  is set to 'landscape, pages are rotated by 90 degrees, and wider line widths are set accordingly. Swapping the paper dimensions  without having the print rotated can be achieved by appending the string  landscape  to the name of the paper size itself (example: "a4landscape").
This function can only be used within a \paper block; it must come before any other functions used within the same \paper block. See also function  set-default-paper-size.

ly:set-property-cache-callback  cb
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.

ly:set-rand-seed  seed
Seed the internal pseudo-random generator with the specified value.

shift-one-duration-log  music  shift  dot
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  g
Shift an item to the right, but only at the start of the line.

shift-semitone->pitch  key  semitone->pitch
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  mus
Replace  mus  by RestEvent of the same duration if it is a SkipEvent. Useful for extracting parts from crowded scores.

skip-of-length  mus
Create a skip of exactly the same length as  mus.

skip-of-moment-span  start-moment  end-moment
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
Is  x  a smob of class Skyline?

ly:skyline->points  skyline  horizon-axis
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
Compute the distance between the two skylines, padding by  horizon-padding  if provided.
ly:skyline-empty? sky
   Return whether skyline sky is empty.

ly:skyline-height skyline x
   Return the height of skyline at point x.

ly:skyline-max-height skyline
   Return the maximum height found in skyline.

ly:skyline-max-height-position skyline
   Return the position at which skyline reaches its maximum height.

ly:skyline-merge skyline1 skyline2
   Merge the two given skylines.

ly:skyline-pad skyline horizon-padding
   Return a version of skyline padded by horizon-padding along the horizon.

ly:skyline-touching-point skyline other-skyline horizon-padding
   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
   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
   Return LilyPond’s internal smob protection list.

ly:solve-spring-rod-problem springs rods length ragged
   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
   Is x a smob of class Source_file?

ly:source-files parser-smob
   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 grob
   A dummy callback that kills the Grob grob if it contains no elements.

ly:span-bar::calc-anchor grob
   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 grob
   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 grob bar-glyph extent
   Build the stencil of the span bar.

ly:span-bar::print grob
   The print routine for span bars.

ly:span-bar::width grob
   Compute the width of the SpanBar stencil.

Span_stem_ engraver ctx
   Connect cross-staff stems to the stems above in the system.

ly:spanner? g
   Is g a spanner object?

ly:spanner-bound spanner dir def
   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
   Return broken-into list for spanner.

ly:spanner-broken-neighbor spanner dir
   Return the broken neighbor of spanner on the next or previous system according to dir. If
   there is no neighbor, return #f.

ly:spanner-set-bound! spanner dir item
   Set grob item as bound in direction dir for spanner.

ly:spawn command rest
   Simple Scheme interface to the GLib function g_spawn_sync. If an error occurs, format it
   with format and rest.

split-list-by-group-lengths lst groups
   Split list into groups whose lengths are given in groups. For example:
   
   (split-list-by-group-lengths '(a b c d e f) '(3 2 1))
   ⇒ ((a b c) (d e) (f))

split-list-by-separator lst pred
   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))

ly:spring? x
   Is x a smob of class Spring?

ly:spring-set-inverse-compress-strength! spring strength
   Set the inverse compress strength of spring.

ly:spring-set-inverse-stretch-strength! spring strength
   Set the inverse stretch strength of spring.

stack-lines dir padding baseline stils
   Stack stencils vertically with a baseline skip.
Chapter 4: Scheme functions

**stack-stencil-line**  *space stencils*  
Adjoin a list of *stencils* along the x axis, leaving *space* between the end of each stencil and the beginning of the following stencil. Stencils with empty y extent are not given *space* before them and don’t avoid overlapping other stencils.

**stack-stencils**  *axis dir padding stils*  
Stack stencils *stils* in direction *axis*, *dir*, using *padding*.

**stack-stencils-padding-list**  *axis dir paddings stils*  
Stack stencils *stils* in direction *axis*, *dir*, using a list of *paddings*.

**staff-ellipsis::calc-y-extent**  *grob*  
Callback for *StaffEllipsis* grob, which is used with *skipTypesetting*.

**staff-ellipsis::print**  *grob*  
Callback for *StaffEllipsis* grob, which is used with *skipTypesetting*.

**ly:staff-symbol-line-thickness**  *grob*  
Return the current staff line thickness in the staff associated with *grob*, expressed as a multiple of the current staff space height.

**ly:staff-symbol-staff-radius**  *grob*  
Return the radius of the staff associated with *grob*.

**ly:staff-symbol-staff-space**  *grob*  
Return the current staff space height in the staff associated with *grob*, expressed as a multiple of the default height of a staff space in the traditional five-line staff.

**ly:stderr-redirect**  *fd-or-file-name mode*  
Redirect standard error output (stderr) to file descriptor *fd* if the first parameter is an integer, or to file *file-name*, opened with *mode*.

**ly:stencil?**  *x*  
Is *x* a smob of class *Stencil*?

**ly:stencil-add**  *args*  
Combine stencils. Takes any number of arguments.

**ly:stencil-aligned-to**  *stil axis dir*  
Align stencil *stil* using its own extents. *dir* is a number. -1 and 1 are left and right, respectively. Other values are interpolated (so 0 means the center).

**ly:stencil-combine-at-edge**  *first axis direction second padding*  
Construct a stencil by putting *second* next to *first*. *axis* can be 0 (x axis) or 1 (y axis). *direction* can be -1 (left or down) or 1 (right or up). The stencils are juxtaposed with *padding* as extra space. *first* and *second* may also be ', () or #f.

**ly:stencil-empty?**  *stil axis*  
Return whether *stil* is empty. If an optional axis is supplied, the emptiness check is restricted to that axis.

**ly:stencil-expr**  *stil*  
Return the expression of stencil *stil*.

**ly:stencil-extent**  *stil axis*  
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-outline stil outline
  Return a stencil with the stencil expression (inking) of stencil stil but with outline and
  dimensions from stencil outline.

stencil-pad-around amount stencil
  Add a padding of amount around stencil, returning a new stencil.

ly:stencil-rotate stil angle x y
  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
  Return a stencil stil rotated by angle degrees around point (x, y), given in absolute coordinates.

ly:stencil-scale stil x y
  Scale stencil stil using the horizontal and vertical scaling factors x and 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
  Construct a stencil by stacking second next to first. axis can be 0 (x axis) or 1 (y axis),
  direction can be -1 (left or down) or 1 (right or up). The stencils are juxtaposed with
  padding as extra space. first and second may also be '()' or '#f. As opposed to ly:
  stencil-combine-at-edge, metrics are suited for successively accumulating lines of stencils.
  Also, second stencil is drawn last.

  If mindist is specified, reference points are placed apart at least by this distance. If either of
  the stencils is spacing, padding and mindist do not apply.

ly:stencil-translate stil offset
  Return a copy of stencil stil but translated by offset (a pair of numbers).

ly:stencil-translate-axis stil amount axis
  Return a copy of stencil stil but translated by amount in axis direction.

stencil-true-extent stencil axis
  Return the extent of the actual printed ink of stencil on axis.

stencil-whiteout stil [style [thickness [line-thickness]]]
  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 stil [thickness [blot [color]]]
  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 still [thickness [color [angle-increments [radial-increments]]]]

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 2*pi, 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 stencils we make on our way out to thickness. angle-increments is how many copies of the white stencil we make between 0 and 2*pi.

stencil-with-color stencil color

Return a modified version of the given stencil that is colored with the given color. See normalize-color for possible color formats.

straight-flag flag-thickness flag-spacing upflag-angle upflag-length
downflag-angle downflag-length

Construct a straight flag stencil function.

The constructed function expects a single argument, grob.

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. If the stroke-style property in grob is set to the string "grace", add a slash through the flag.

This is an auxiliary function for modern-straight-flag, old-straight-flag, and flat-flag.

ly:stream-event? obj
Is obj a Stream_event object?

string->string-list str
Convert string str into a list of strings with length 1. "aBc" will be converted to ("a" "B" "c"). For an empty string or if str is not of type string?, return a list containing "".

ly:string-percent-encode str
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
Replace string a by string b in string s.

style-note-heads heads style music
Set style for all heads in music. Works both inside of and outside of chord construct.

suggest-convert-ly-message version-seen
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 names ...
Like string-concatenate, but for symbols.

ly:system-font-load name
Load the OpenType system font name.otf. Fonts loaded with this command must contain two additional SFNT font tables called LILC 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.
Chapter 4: Scheme functions

**tag-group-get** *tag*
Return the tag group (as a list of symbols) that the given *tag* symbol belongs to, #f if none.

**tags-keep-predicate** *tags*
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** *tags*
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** *context pitch barnum*
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**
Convert a text markup into a stencil. layout is a \layout block. props is an alist chain, i.e., a list of alists. markup is the markup text to be processed. See also grob-interpret-markup.

**ly:time-signature::print** *grob*
Print routine for time signatures.

**ly:time-signature::print-x** *grob*
Print routine for an X-shaped sign indicating no time signature.

**to-staff-space** *size [unit]*
Convert absolute *size* in *unit* to staff-space units.
Possible values for *unit* are 'pt, 'bp, 'mm, 'cm, and 'in. If *unit* is omitted, use 'pt.
Example:
\markup \hspace #(to-staff-space 25 'mm)

**ly:transform?** *x*
Is *x* a smob of class Transform?

**ly:transform->list** *transform*
Convert a transform matrix to a list of six values. Values are xx, yx, xy, yy, x0, y0.

**ly:translate-cpp-warning-scheme** *str*
Translate a string in C++ printf format and modify it to use it for Scheme formatting.

**ly:translator?** *x*
Is *x* a smob of class Translator?

**ly:translator-context** *trans*
Return the context of the translator object *trans*.

**ly:translator-description** *creator*
Return an alist of properties of translator definition *creator*.

**ly:translator-group?** *x*
Is *x* a smob of class Translator_group?

**ly:translator-name** *creator*
Return the type name of the translator definition *creator*. The name is a symbol.

**ly:transpose-key-alist** *l* *pit*
Make a new key alist of *l* transposed by pitch *pit*. 
**ly:ttf->pfa ttf-file-name idx**  
Convert the contents of a TrueType font file to PostScript Type 42 font, returning it as a string. The optional idx argument is useful for TrueType collections (TTC) only; it specifies the font index within the TTC. The default value of idx is 0.

**ly:ttf-ps-name ttf-file-name idx**  
Extract the PostScript name from a TrueType font. The optional idx argument is useful for TrueType collections (TTC) only; it specifies the font index within the TTC. The default value of idx is 0.

**ly:tuplet-description? x**  
Is x a smob of class Tuplet_description?

**unbroken-or-first-broken-spanner? spanner**  
Is spanner either unbroken or the first of its broken siblings?

**unbroken-or-last-broken-spanner? spanner**  
Is spanner either unbroken or the last of its broken siblings?

**unbroken-spanner? spanner**  
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 types music**  
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 music**  
Unfold repeats and expand the resulting unfolded-repeated-music.

**uniq-list lst**  
Remove doublets from list lst (i.e., make its elements unique), assuming that it is sorted. Uses equal? for comparisons.

**uniqed-alist alist [hash-func [assoc-func]]**  
Make keys unique in alist. If duplicate keys are found, the first key-value pair is kept. The order of entries is otherwise preserved. The optional arguments hash-func and assoc-func are a hashing function and an alist retrieval function, as in Guile’s hashx-... functions.

**unity-if-multimeasure context dur**  
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**  
Convert property data (unpure-pure container or procedure) to value in an unpure context defined by grob and possibly rest arguments.

**ly:unpure-pure-container? x**  
Is x a smob of class Unpure_pure_container?

**ly:unpure-pure-container-pure-part pc**  
Return the pure part of pc.

**ly:unpure-pure-container-unpure-part pc**  
Return the unpure part of pc.
ly:usage
Print usage message.

value-for-spanner-piece property args
Associate a piece of broken spanner grob with an element of list arg.

ly:verbose-output?
Was verbose output requested, i.e., is the log level at least DEBUG?

ly:version
Return the current LilyPond version as a list, e.g., (1 3 127 uu1).

ly:version? op ver
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 m [id]
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 bar-glyph
Determine the visibility of the volta bracket end hook, returning #t if no hook should be drawn.

ly:volta-bracket::calc-shorten-pair grob
Calculate the shorten-pair values for an ideal placement of the volta brackets relative to the bar lines.

volta-spec-music number-list music
Add \volta number-list to music.

ly:warning str rest
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
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
Encode the Unicode codepoint wc, an integer, as UTF-8.

write-me message x
Return x. Display message and write x. Handy for debugging, possibly turned off.
# Appendix A  Indices

## A.1  Concept index

(Index is nonexistent)

## A.2  Function index

### A

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