LilyPond

The music typesetter

Internals Reference

The LilyPond development team

This manual is a technical reference for all internal elements used by LilyPond version 2.26.0 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/`.

Copyright © 2000–2026 by the authors

Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.1 or any later version published by the Free Software Foundation; with no Invariant Sections.

For LilyPond version 2.26.0

Table of Contents

1 Music definitions 1

1.1 Music expressions 1

1.1.1 AbsoluteDynamicEvent 1
1.1.2 AdHocJumpEvent 1
1.1.3 AdHocMarkEvent 1
1.1.4 AlternativeEvent 2
1.1.5 AnnotateOutputEvent 2
1.1.6 ApplyContext 2
1.1.7 ApplyOutputEvent 3
1.1.8 ArpeggioEvent 3
1.1.9 ArticulationEvent 3
1.1.10 BarCheckEvent 4
1.1.11 BarEvent 4
1.1.12 BassFigureEvent 4
1.1.13 BeamEvent 5
1.1.14 BeamForbidEvent 5
1.1.15 BendAfterEvent 5
1.1.16 BendSpanEvent 6
1.1.17 BreakDynamicSpanEvent 6
1.1.18 BreathingEvent 6
1.1.19 CaesuraEvent 7
1.1.20 ChordSlurEvent 7
1.1.21 ClusterNoteEvent 7
1.1.22 CodaMarkEvent 8
1.1.23 CompletizeExtenderEvent 8
1.1.24 ContextChange 8
1.1.25 ContextSpeccedMusic 9
1.1.26 CrescendoEvent 9
1.1.27 DalSegnoEvent 10
1.1.28 DecrescendoEvent 10
1.1.29 DoublePercentEvent 11
1.1.30 DurationLineEvent 11
1.1.31 EpisemaEvent 11
1.1.32 Event 12
1.1.33 EventChord 12
1.1.34 ExtenderEvent 12
1.1.35 FineEvent 13
1.1.36 FingerGlideEvent 13
1.1.37 FingeringEvent 14
1.1.38 FootnoteEvent 14
1.1.39 GlissandoEvent 14
1.1.40 GraceMusic 15
1.1.41 HarmonicEvent 15
1.1.42 HyphenEvent 15
1.1.43 InitialContextMusic 16
1.1.44 KeyChangeEvent 16
1.1.45 LabelEvent 17
1.1.46 LaissezVibrerEvent 17

1.1.47 LigatureEvent 17
1.1.48 LineBreakEvent 18
1.1.49 LyricCombineMusic 18
1.1.50 LyricEvent 18
1.1.51 MeasureCounterEvent 19
1.1.52 MeasureSpannerEvent 19
1.1.53 MultiMeasureArticulationEvent 19
1.1.54 MultiMeasureRestEvent 20
1.1.55 MultiMeasureRestMusic 20
1.1.56 MultiMeasureTextEvent 21
1.1.57 Music 21
1.1.58 NonArpeggiatoEvent 21
1.1.59 NoteEvent 22
1.1.60 NoteGroupingEvent 22
1.1.61 OptionalMaterialEvent 23
1.1.62 OttavaEvent 23
1.1.63 OverrideProperty 23
1.1.64 PageBreakEvent 24
1.1.65 PageTurnEvent 24
1.1.66 PartCombineEvent 24
1.1.67 PartCombineMusic 25
1.1.68 PartialEvent 25
1.1.69 PartialSet 25
1.1.70 PercentEvent 26
1.1.71 PercentRepeatedMusic 26
1.1.72 PesOrFlexaEvent 27
1.1.73 PhrasingSlurEvent 27
1.1.74 PolymetricTimeSignatureEvent 27
1.1.75 PolymetricTimeSignatureMusic 28
1.1.76 PostEvents 28
1.1.77 PropertySet 29
1.1.78 PropertyUnset 29
1.1.79 QuoteMusic 29
1.1.80 ReferenceTimeSignatureEvent 30
1.1.81 ReferenceTimeSignatureMusic 30
1.1.82 RehearsalMarkEvent 31
1.1.83 RelativeOctaveCheck 31
1.1.84 RelativeOctaveMusic 31
1.1.85 RepeatSlashEvent 32
1.1.86 RepeatTieEvent 32
1.1.87 RestEvent 32
1.1.88 RevertProperty 33
1.1.89 ScriptEvent 33
1.1.90 SectionEvent 34
1.1.91 SectionLabelEvent 34
1.1.92 SegnoMarkEvent 34
1.1.93 SegnoRepeatedMusic 35
1.1.94 SequentialAlternativeMusic 35
1.1.95 SequentialMusic 36
1.1.96 SimultaneousMusic 36
1.1.97 SkipEvent 37
1.1.98 SkipMusic 37

1.1.99 SkippedMusic 38
1.1.100 SlurEvent 38
1.1.101 SostenutoEvent 39
1.1.102 SpacingSectionEvent 39
1.1.103 SpanEvent 39
1.1.104 StaffHighlightEvent 40
1.1.105 StaffSpanEvent 40
1.1.106 StringNumberEvent 40
1.1.107 StrokeFingerEvent 41
1.1.108 SustainEvent 41
1.1.109 TempoChangeEvent 41
1.1.110 TextMarkEvent 42
1.1.111 TextScriptEvent 42
1.1.112 TextSpanEvent 42
1.1.113 TieEvent 43
1.1.114 TimeScaledMusic 43
1.1.115 TransposedMusic 43
1.1.116 TremoloEvent 44
1.1.117 TremoloRepeatedMusic 44
1.1.118 TremoloSpanEvent 45
1.1.119 TrillSpanEvent 45
1.1.120 TupletSpanEvent 46
1.1.121 UnaCordaEvent 46
1.1.122 UnfoldedRepeatedMusic 46
1.1.123 UnfoldedSpeccedMusic 47
1.1.124 UnrelativableMusic 47
1.1.125 VoiceSeparator 48
1.1.126 VoltaRepeatEndEvent 48
1.1.127 VoltaRepeatStartEvent 48
1.1.128 VoltaRepeatedMusic 49
1.1.129 VoltaSpanEvent 49
1.1.130 VoltaSpeccedMusic 50
1.1.131 VowelTransitionEvent 50
1.2 Music classes 50
1.2.1 absolute-dynamic-event 50
1.2.2 ad-hoc-jump-event 51
1.2.3 ad-hoc-mark-event 51
1.2.4 alternative-event 51
1.2.5 annotate-output-event 51
1.2.6 apply-output-event 51
1.2.7 arpeggio-event 51
1.2.8 articulation-event 51
1.2.9 bar-check-event 51
1.2.10 bar-event 51
1.2.11 bass-figure-event 51
1.2.12 beam-event 51
1.2.13 beam-forbid-event 52
1.2.14 bend-after-event 52
1.2.15 bend-span-event 52
1.2.16 break-dynamic-span-event 52
1.2.17 break-event 52
1.2.18 break-span-event 52

1.2.19 breathing-event 52
1.2.20 caesura-event 52
1.2.21 chord-slur-event 52
1.2.22 cluster-note-event 52
1.2.23 coda-mark-event 52
1.2.24 completize-extender-event 53
1.2.25 crescendo-event 53
1.2.26 dal-segno-event 53
1.2.27 decrescendo-event 53
1.2.28 double-percent-event 53
1.2.29 duration-line-event 53
1.2.30 dynamic-event 53
1.2.31 episema-event 53
1.2.32 extender-event 53
1.2.33 fine-event 53
1.2.34 finger-glide-event 54
1.2.35 fingering-event 54
1.2.36 footnote-event 54
1.2.37 general-rest-event 54
1.2.38 glissando-event 54
1.2.39 harmonic-event 54
1.2.40 hyphen-event 54
1.2.41 key-change-event 54
1.2.42 label-event 54
1.2.43 laissez-vibrer-event 54
1.2.44 layout-instruction-event 54
1.2.45 ligature-event 55
1.2.46 line-break-event 55
1.2.47 lyric-event 55
1.2.48 mark-event 55
1.2.49 measure-counter-event 55
1.2.50 measure-spanner-event 55
1.2.51 melodic-event 55
1.2.52 multi-measure-articulation-event 55
1.2.53 multi-measure-rest-event 55
1.2.54 multi-measure-text-event 55
1.2.55 music-event 56
1.2.56 non-arpeggiato-event 56
1.2.57 note-event 56
1.2.58 note-grouping-event 57
1.2.59 optional-material-event 57
1.2.60 ottava-event 57
1.2.61 page-break-event 57
1.2.62 page-turn-event 57
1.2.63 part-combine-event 57
1.2.64 partial-event 57
1.2.65 pedal-event 57
1.2.66 percent-event 57
1.2.67 pes-or-flexa-event 57
1.2.68 phrasing-slur-event 57
1.2.69 polymetric-time-signature-event 58
1.2.70 reference-time-signature-event 58

1.2.71 rehearsal-mark-event 58
1.2.72 repeat-slash-event 58
1.2.73 repeat-tie-event 58
1.2.74 rest-event 58
1.2.75 rhythmic-event 58
1.2.76 script-event 58
1.2.77 section-event 58
1.2.78 section-label-event 58
1.2.79 segno-mark-event 59
1.2.80 skip-event 59
1.2.81 slur-event 59
1.2.82 sostenuto-event 59
1.2.83 spacing-section-event 59
1.2.84 span-dynamic-event 59
1.2.85 span-event 59
1.2.86 staff-highlight-event 59
1.2.87 staff-span-event 59
1.2.88 StreamEvent 60
1.2.89 string-number-event 60
1.2.90 stroke-finger-event 60
1.2.91 structural-event 60
1.2.92 sustain-event 61
1.2.93 tempo-change-event 61
1.2.94 text-mark-event 61
1.2.95 text-script-event 61
1.2.96 text-span-event 61
1.2.97 tie-event 61
1.2.98 time-signature-event 61
1.2.99 tremolo-event 61
1.2.100 tremolo-span-event 61
1.2.101 trill-span-event 61
1.2.102 tuplet-span-event 62
1.2.103 una-corda-event 62
1.2.104 volta-repeat-end-event 62
1.2.105 volta-repeat-start-event 62
1.2.106 volta-span-event 62
1.2.107 vowel-transition-event 62
1.3 Music properties 62

2 Translation 69

2.1 Contexts 69
2.1.1 ChoirStaff 69
2.1.2 ChordGrid 71
2.1.3 ChordGridScore 77
2.1.4 ChordNames 100
2.1.5 CueVoice 102
2.1.6 Devnull 113
2.1.7 DrumStaff 113
2.1.8 DrumVoice 123
2.1.9 Dynamics 133
2.1.10 FiguredBass 138

2.1.11 FretBoards 140
2.1.12 Global 142
2.1.13 GrandStaff 142
2.1.14 GregorianTranscriptionLyrics 144
2.1.15 GregorianTranscriptionStaff 147
2.1.16 GregorianTranscriptionVoice 160
2.1.17 InternalGregorianStaff 171
2.1.18 InternalMensuralStaff 184
2.1.19 KievanStaff 198
2.1.20 KievanVoice 212
2.1.21 Lyrics 223
2.1.22 MensuralStaff 225
2.1.23 MensuralVoice 240
2.1.24 NoteNames 250
2.1.25 NullVoice 252
2.1.26 OneStaff 254
2.1.27 PetrucciStaff 255
2.1.28 PetrucciVoice 270
2.1.29 PianoStaff 281
2.1.30 RhythmicStaff 283
2.1.31 Score 289
2.1.32 Staff 314
2.1.33 StaffGroup 327
2.1.34 StandaloneRhythmScore 329
2.1.35 StandaloneRhythmStaff 353
2.1.36 StandaloneRhythmVoice 359
2.1.37 TabStaff 370
2.1.38 TabVoice 382
2.1.39 VaticanaLyrics 393
2.1.40 VaticanaScore 396
2.1.41 VaticanaStaff 419
2.1.42 VaticanaVoice 434
2.1.43 Voice 444
2.2 Engravers and Performers 455
2.2.1 Accidental_engraver 455
2.2.2 Alteration_glyph_engraver 456
2.2.3 Ambitus_engraver 456
2.2.4 Apply_output_engraver 457
2.2.5 Arpeggio_engraver 457
2.2.6 Auto_beam_engraver 457
2.2.7 Axis_group_engraver 458
2.2.8 Balloon_engraver 459
2.2.9 Bar_engraver 459
2.2.10 Bar_number_engraver 461
2.2.11 Beam_collision_engraver 463
2.2.12 Beam_engraver 463
2.2.13 Beam_performer 463
2.2.14 Beat_engraver 463
2.2.15 Beat_performer 464
2.2.16 Bend_engraver 465
2.2.17 Bend_spanner_engraver 465
2.2.18 Break_align_engraver 465

2.2.19 Breathing_sign_engraver 466
2.2.20 Caesura_engraver 466
2.2.21 Centered_bar_number_align_engraver 467
2.2.22 Chord_name_engraver 467
2.2.23 Chord_square_engraver 467
2.2.24 Chord_tremolo_engraver 468
2.2.25 Clef_engraver 468
2.2.26 Cluster_spanner_engraver 469
2.2.27 Collision_engraver 469
2.2.28 Completion_heads_engraver 469
2.2.29 Completion_rest_engraver 470
2.2.30 Concurrent_hairpin_engraver 470
2.2.31 Control_track_performer 470
2.2.32 Cue_clef_engraver 471
2.2.33 Current_chord_text_engraver 471
2.2.34 Custos_engraver 472
2.2.35 Divisio_engraver 472
2.2.36 Dot_column_engraver 473
2.2.37 Dots_engraver 473
2.2.38 Double_percent_repeat_engraver 473
2.2.39 Drum_note_performer 474
2.2.40 Drum_notes_engraver 474
2.2.41 Duration_line_engraver 474
2.2.42 Dynamic_align_engraver 475
2.2.43 Dynamic_engraver 475
2.2.44 Dynamic_performer 476
2.2.45 Episema_engraver 476
2.2.46 Extender_engraver 476
2.2.47 Figured_bass_engraver 477
2.2.48 Figured_bass_position_engraver 477
2.2.49 Finger_glide_engraver 477
2.2.50 Fingering_column_engraver 478
2.2.51 Fingering_engraver 478
2.2.52 Font_size_engraver 478
2.2.53 Footnote_engraver 478
2.2.54 Forbid_line_break_engraver 478
2.2.55 Fretboard_engraver 479
2.2.56 Glissando_engraver 480
2.2.57 Grace_auto_beam_engraver 480
2.2.58 Grace_beam_engraver 480
2.2.59 Grace_engraver 481
2.2.60 Grace_spacing_engraver 481
2.2.61 Grid_chord_name_engraver 481
2.2.62 Grid_line_span_engraver 481
2.2.63 Grid_point_engraver 482
2.2.64 Grob_pq_engraver 482
2.2.65 Horizontal_bracket_engraver 482
2.2.66 Horizontal_script_engraver 482
2.2.67 Hyphen_engraver 483
2.2.68 Instrument_name_engraver 483
2.2.69 Instrument_switch_engraver 483
2.2.70 Jump_engraver 484

2.2.71 Keep_alive_together_engraver 485
2.2.72 Key_engraver 485
2.2.73 Key_performer 486
2.2.74 Kievan_ligature_engraver 486
2.2.75 Laissez_vibrer_engraver 486
2.2.76 Ledger_line_engraver 486
2.2.77 Ligature_bracket_engraver 487
2.2.78 Lyric_engraver 487
2.2.79 Lyric_performer 487
2.2.80 Lyric_repeat_count_engraver 487
2.2.81 Mark_engraver 488
2.2.82 Mark_performer 488
2.2.83 Mark_tracking_translator 489
2.2.84 Measure_counter_engraver 489
2.2.85 Measure_grouping_engraver 490
2.2.86 Measure_spanner_engraver 490
2.2.87 Melody_engraver 490
2.2.88 Mensural_ligature_engraver 491
2.2.89 Merge_mmrest_numbers_engraver 491
2.2.90 Merge_rests_engraver 491
2.2.91 Metronome_mark_engraver 491
2.2.92 Midi_control_change_performer 492
2.2.93 Multi_measure_rest_engraver 492
2.2.94 New_fingering_engraver 493
2.2.95 Non_musical_script_column_engraver 493
2.2.96 Note_head_line_engraver 493
2.2.97 Note_heads_engraver 494
2.2.98 Note_name_engraver 494
2.2.99 Note_performer 494
2.2.100 Note_spacing_engraver 495
2.2.101 Optional_material_bracket_engraver 495
2.2.102 Ottava_spanner_engraver 495
2.2.103 Page_turn_engraver 495
2.2.104 Paper_column_engraver 496
2.2.105 Parenthesis_engraver 496
2.2.106 Part_combine_engraver 496
2.2.107 Percent_repeat_engraver 497
2.2.108 Phrasing_slur_engraver 497
2.2.109 Piano_pedal_align_engraver 498
2.2.110 Piano_pedal_engraver 498
2.2.111 Piano_pedal_performer 499
2.2.112 Pitch_squash_engraver 499
2.2.113 Pitched_trill_engraver 499
2.2.114 Pure_from_neighbor_engraver 499
2.2.115 Repeat_acknowledge_engraver 499
2.2.116 Repeat_tie_engraver 500
2.2.117 Rest_collision_engraver 500
2.2.118 Rest_engraver 500
2.2.119 Rhythmic_column_engraver 501
2.2.120 Script_column_engraver 501
2.2.121 Script_engraver 501
2.2.122 Script_row_engraver 501

2.2.123 Separating_line_group_engraver 502
2.2.124 Show_control_points_engraver 502
2.2.125 Signum_repetitionis_engraver 502
2.2.126 Skip_typesetting_engraver 502
2.2.127 Slash_repeat_engraver 503
2.2.128 Slur_engraver 503
2.2.129 Slur_performer 503
2.2.130 Spacing_engraver 503
2.2.131 Span_arpeggio_engraver 504
2.2.132 Span_bar_engraver 504
2.2.133 Span_bar_stub_engraver 504
2.2.134 Span_stem_engraver 504
2.2.135 Spanner_break_forbid_engraver 504
2.2.136 Spanner_tracking_engraver 504
2.2.137 Staff_collecting_engraver 505
2.2.138 Staff_highlight_engraver 505
2.2.139 Staff_performer 505
2.2.140 Staff_symbol_engraver 506
2.2.141 Stanza_number_align_engraver 506
2.2.142 Stanza_number_engraver 506
2.2.143 Stem_engraver 506
2.2.144 System_start_delimiter_engraver 507
2.2.145 Tab_note_heads_engraver 507
2.2.146 Tab_staff_symbol_engraver 508
2.2.147 Tab_tie_follow_engraver 508
2.2.148 Tempo_performer 508
2.2.149 Text_engraver 509
2.2.150 Text_mark_engraver 509
2.2.151 Text_spanner_engraver 509
2.2.152 Tie_engraver 509
2.2.153 Tie_performer 510
2.2.154 Time_signature_engraver 510
2.2.155 Time_signature_performer 510
2.2.156 Timing_translator 511
2.2.157 Toe_heel_engraver 512
2.2.158 Trill_spanner_engraver 512
2.2.159 Tuplet_engraver 512
2.2.160 Tweak_engraver 513
2.2.161 Vaticana_ligature_engraver 513
2.2.162 Vertical_align_engraver 513
2.2.163 Volta_engraver 513
2.3 Tunable context properties 514
2.4 Internal context properties 529

3 Backend 533

3.1 All layout objects 533
3.1.1 Accidental 533
3.1.2 AccidentalCautionary 534
3.1.3 AccidentalPlacement 535
3.1.4 AccidentalSuggestion 536
3.1.5 Ambitus 538

3.1.6 AmbitusAccidental 540
3.1.7 AmbitusLine 540
3.1.8 AmbitusNoteHead 541
3.1.9 ApproximatePitchNoteHead 542
3.1.10 Arpeggio 544
3.1.11 BalloonText 545
3.1.12 BarLine 547
3.1.13 BarNumber 551
3.1.14 BassFigure 553
3.1.15 BassFigureAlignment 553
3.1.16 BassFigureAlignmentPositioning 554
3.1.17 BassFigureBracket 555
3.1.18 BassFigureContinuation 556
3.1.19 BassFigureLine 556
3.1.20 Beam 557
3.1.21 BendAfter 560
3.1.22 BendSpanner 561
3.1.23 BreakAlignGroup 563
3.1.24 BreakAlignment 564
3.1.25 BreathingSign 565
3.1.26 CaesuraScript 568
3.1.27 CenteredBarNumber 569
3.1.28 CenteredBarNumberLineSpanner 570
3.1.29 ChordBracket 572
3.1.30 ChordName 573
3.1.31 ChordSlur 574
3.1.32 ChordSquare 576
3.1.33 Clef 577
3.1.34 ClefModifier 580
3.1.35 ClusterSpanner 582
3.1.36 ClusterSpannerBeacon 582
3.1.37 CodaMark 583
3.1.38 CombineTextScript 585
3.1.39 ControlPoint 587
3.1.40 ControlPolygon 588
3.1.41 CueClef 589
3.1.42 CueEndClef 592
3.1.43 Custos 595
3.1.44 Divisio 597
3.1.45 DotColumn 600
3.1.46 Dots 600
3.1.47 DoublePercentRepeat 602
3.1.48 DoublePercentRepeatCounter 603
3.1.49 DoubleRepeatSlash 604
3.1.50 DurationLine 605
3.1.51 DynamicLineSpanner 607
3.1.52 DynamicText 609
3.1.53 DynamicTextSpanner 611
3.1.54 Episema 612
3.1.55 FingerGlideSpanner 613
3.1.56 Fingering 615
3.1.57 FingeringColumn 617

3.1.58 Flag 617
3.1.59 Footnote 618
3.1.60 FretBoard 620
3.1.61 Glissando 622
3.1.62 GraceSpacing 623
3.1.63 GridChordName 623
3.1.64 GridLine 624
3.1.65 GridPoint 625
3.1.66 Hairpin 626
3.1.67 HorizontalBracket 627
3.1.68 HorizontalBracketText 629
3.1.69 InstrumentName 630
3.1.70 InstrumentSwitch 631
3.1.71 JumpScript 633
3.1.72 KeyCancellation 634
3.1.73 KeySignature 637
3.1.74 KievanLigature 640
3.1.75 LaissezVibrerTie 641
3.1.76 LaissezVibrerTieColumn 642
3.1.77 LedgerLineSpanner 643
3.1.78 LeftEdge 643
3.1.79 LigatureBracket 646
3.1.80 LyricExtender 647
3.1.81 LyricHyphen 648
3.1.82 LyricRepeatCount 649
3.1.83 LyricSpace 651
3.1.84 LyricText 651
3.1.85 MeasureCounter 653
3.1.86 MeasureGrouping 655
3.1.87 MeasureSpanner 656
3.1.88 MelodyItem 658
3.1.89 MensuralLigature 658
3.1.90 MetronomeMark 658
3.1.91 MultiMeasureRest 660
3.1.92 MultiMeasureRestNumber 662
3.1.93 MultiMeasureRestScript 664
3.1.94 MultiMeasureRestText 665
3.1.95 NonMusicalPaperColumn 667
3.1.96 NoteCollision 668
3.1.97 NoteColumn 669
3.1.98 NoteHead 670
3.1.99 NoteName 671
3.1.100 NoteSpacing 672
3.1.101 OptionalMaterialBracket 673
3.1.102 OttavaBracket 676
3.1.103 PaperColumn 677
3.1.104 Parentheses 678
3.1.105 PercentRepeat 679
3.1.106 PercentRepeatCounter 680
3.1.107 PhrasingSlur 682
3.1.108 PianoPedalBracket 684
3.1.109 RehearsalMark 685

3.1.110 RepeatSlash 687
3.1.111 RepeatTie 688
3.1.112 RepeatTieColumn 689
3.1.113 Rest 689
3.1.114 RestCollision 690
3.1.115 Script 691
3.1.116 ScriptColumn 692
3.1.117 ScriptRow 693
3.1.118 SectionLabel 693
3.1.119 SegnoMark 695
3.1.120 SignumRepetitionis 697
3.1.121 Slur 700
3.1.122 SostenutoPedal 702
3.1.123 SostenutoPedalLineSpanner 704
3.1.124 SpacingSpanner 705
3.1.125 SpanBar 706
3.1.126 SpanBarStub 707
3.1.127 StaffEllipsis 708
3.1.128 StaffGrouper 710
3.1.129 StaffHighlight 711
3.1.130 StaffSpacing 712
3.1.131 StaffSymbol 713
3.1.132 StanzaNumber 714
3.1.133 Stem 715
3.1.134 StemStub 717
3.1.135 StemTremolo 717
3.1.136 StringNumber 718
3.1.137 StrokeFinger 720
3.1.138 SustainPedal 722
3.1.139 SustainPedalLineSpanner 723
3.1.140 System 724
3.1.141 SystemStartBar 725
3.1.142 SystemStartBrace 726
3.1.143 SystemStartBracket 727
3.1.144 SystemStartSquare 728
3.1.145 TabNoteHead 729
3.1.146 TextMark 731
3.1.147 TextScript 733
3.1.148 TextSpanner 735
3.1.149 Tie 737
3.1.150 TieColumn 739
3.1.151 TimeSignature 739
3.1.152 TrillPitchAccidental 742
3.1.153 TrillPitchGroup 743
3.1.154 TrillPitchHead 744
3.1.155 TrillPitchParentheses 745
3.1.156 TrillSpanner 746
3.1.157 TupletBracket 747
3.1.158 TupletNumber 749
3.1.159 UnaCordaPedal 750
3.1.160 UnaCordaPedalLineSpanner 752
3.1.161 VaticanaLigature 753

3.1.162 VerticalAlignment 753
3.1.163 VerticalAxisGroup 754
3.1.164 VoiceFollower 756
3.1.165 VoltaBracket 757
3.1.166 VoltaBracketSpanner 758
3.1.167 VowelTransition 760
3.2 Graphical Object Interfaces 761
3.2.1 accidental-interface 761
3.2.2 accidental-participating-head-interface 762
3.2.3 accidental-placement-interface 762
3.2.4 accidental-suggestion-interface 762
3.2.5 accidental-switch-interface 762
3.2.6 align-interface 763
3.2.7 ambitus-interface 763
3.2.8 arpeggio-interface 764
3.2.9 axis-group-interface 764
3.2.10 balloon-interface 766
3.2.11 bar-line-interface 767
3.2.12 bar-number-interface 769
3.2.13 bass-figure-alignment-interface 769
3.2.14 bass-figure-interface 769
3.2.15 beam-interface 769
3.2.16 bend-after-interface 772
3.2.17 bend-interface 772
3.2.18 bezier-curve-interface 773
3.2.19 break-alignable-interface 774
3.2.20 break-aligned-interface 774
3.2.21 break-alignment-interface 776
3.2.22 breathing-sign-interface 776
3.2.23 caesura-script-interface 777
3.2.24 centered-bar-number-interface 777
3.2.25 centered-bar-number-line-spanner-interface 777
3.2.26 centered-spanner-interface 777
3.2.27 chord-bracket-interface 777
3.2.28 chord-name-interface 778
3.2.29 chord-slur-interface 778
3.2.30 chord-square-interface 779
3.2.31 clef-interface 780
3.2.32 clef-modifier-interface 780
3.2.33 cluster-beacon-interface 780
3.2.34 cluster-interface 780
3.2.35 coda-mark-interface 781
3.2.36 control-point-interface 781
3.2.37 control-polygon-interface 781
3.2.38 custos-interface 782
3.2.39 dot-column-interface 782
3.2.40 dots-interface 782
3.2.41 duration-line-interface 783
3.2.42 dynamic-interface 784
3.2.43 dynamic-line-spanner-interface 784
3.2.44 dynamic-text-interface 784
3.2.45 dynamic-text-spanner-interface 784

3.2.46 enclosing-bracket-interface 784
3.2.47 episema-interface 785
3.2.48 figured-bass-continuation-interface 785
3.2.49 finger-glide-interface 785
3.2.50 finger-interface 786
3.2.51 fingering-column-interface 786
3.2.52 flag-interface 787
3.2.53 font-interface 787
3.2.54 footnote-interface 789
3.2.55 fret-diagram-interface 789
3.2.56 glissando-interface 791
3.2.57 grace-spacing-interface 791
3.2.58 gregorian-ligature-interface 791
3.2.59 grid-chord-name-interface 792
3.2.60 grid-line-interface 792
3.2.61 grid-point-interface 793
3.2.62 grob-interface 793
3.2.63 hairpin-interface 797
3.2.64 hara-kiri-group-spanner-interface 798
3.2.65 horizontal-bracket-interface 799
3.2.66 horizontal-bracket-text-interface 799
3.2.67 horizontal-line-spanner-interface 799
3.2.68 inline-accidental-interface 800
3.2.69 instrument-specific-markup-interface 800
3.2.70 item-interface 802
3.2.71 jump-script-interface 804
3.2.72 key-cancellation-interface 804
3.2.73 key-signature-interface 804
3.2.74 kievan-ligature-interface 805
3.2.75 ledger-line-spanner-interface 805
3.2.76 ledgered-grob-interface 806
3.2.77 ledgered-interface 806
3.2.78 ligature-bracket-interface 806
3.2.79 ligature-head-interface 807
3.2.80 ligature-interface 807
3.2.81 line-interface 807
3.2.82 line-spanner-interface 808
3.2.83 lyric-extender-interface 809
3.2.84 lyric-hyphen-interface 810
3.2.85 lyric-interface 811
3.2.86 lyric-repeat-count-interface 811
3.2.87 lyric-space-interface 811
3.2.88 lyric-syllable-interface 811
3.2.89 mark-interface 811
3.2.90 measure-counter-interface 811
3.2.91 measure-grouping-interface 812
3.2.92 measure-spanner-interface 812
3.2.93 melody-spanner-interface 813
3.2.94 mensural-ligature-interface 813
3.2.95 metronome-mark-interface 814
3.2.96 multi-measure-interface 814
3.2.97 multi-measure-rest-interface 814

3.2.98 multi-measure-rest-number-interface 816
3.2.99 musical-paper-column-interface 816
3.2.100 non-musical-paper-column-interface 816
3.2.101 note-collision-interface 817
3.2.102 note-column-interface 818
3.2.103 note-head-interface 818
3.2.104 note-name-interface 819
3.2.105 note-spacing-interface 819
3.2.106 number-interface 820
3.2.107 optional-material-bracket-interface 820
3.2.108 ottava-bracket-interface 821
3.2.109 outside-staff-axis-group-interface 821
3.2.110 outside-staff-interface 822
3.2.111 paper-column-interface 822
3.2.112 parentheses-interface 823
3.2.113 passage-delimiter-interface 823
3.2.114 percent-repeat-interface 824
3.2.115 piano-pedal-bracket-interface 824
3.2.116 piano-pedal-interface 825
3.2.117 piano-pedal-script-interface 825
3.2.118 pitched-trill-interface 825
3.2.119 pure-from-neighbor-interface 825
3.2.120 rehearsal-mark-interface 826
3.2.121 rest-collision-interface 826
3.2.122 rest-interface 826
3.2.123 rhythmic-grob-interface 826
3.2.124 rhythmic-head-interface 827
3.2.125 script-column-interface 827
3.2.126 script-interface 827
3.2.127 section-label-interface 828
3.2.128 segno-mark-interface 828
3.2.129 self-alignment-interface 829
3.2.130 semi-tie-column-interface 830
3.2.131 semi-tie-interface 830
3.2.132 separation-item-interface 831
3.2.133 side-position-interface 832
3.2.134 signum-repetitionis-interface 833
3.2.135 slur-interface 834
3.2.136 spaceable-grob-interface 837
3.2.137 spacing-interface 837
3.2.138 spacing-options-interface 838
3.2.139 spacing-spanner-interface 838
3.2.140 span-bar-interface 839
3.2.141 span-bar-stub-interface 839
3.2.142 spanner-interface 840
3.2.143 staff-ellipsis-interface 841
3.2.144 staff-grouper-interface 841
3.2.145 staff-highlight-interface 841
3.2.146 staff-spacing-interface 842
3.2.147 staff-symbol-interface 842
3.2.148 staff-symbol-referencer-interface 843
3.2.149 stanza-number-interface 843

3.2.150 stem-interface 843
3.2.151 stem-tremolo-interface 846
3.2.152 sticky-grob-interface 846
3.2.153 string-number-interface 847
3.2.154 stroke-finger-interface 847
3.2.155 system-interface 847
3.2.156 system-start-delimiter-interface 848
3.2.157 system-start-text-interface 848
3.2.158 tab-note-head-interface 849
3.2.159 text-interface 850
3.2.160 text-mark-interface 851
3.2.161 text-script-interface 851
3.2.162 tie-column-interface 852
3.2.163 tie-interface 852
3.2.164 time-signature-interface 855
3.2.165 trill-pitch-accidental-interface 856
3.2.166 trill-spanner-interface 856
3.2.167 tuplet-bracket-interface 856
3.2.168 tuplet-number-interface 858
3.2.169 unbreakable-spanner-interface 859
3.2.170 vaticana-ligature-interface 859
3.2.171 volta-bracket-interface 860
3.2.172 volta-interface 861
3.3 User backend properties 861
3.4 Internal backend properties 886

4 Scheme functions 895

A Indices 963
A.1 Function index 963

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 50), dynamic-event (page 53), music-event (page 56), and StreamEvent (page 60).

Accepted by: Dynamic_engraver (page 475), and Dynamic_performer (page 476).

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 51), music-event (page 56), and StreamEvent (page 60).

Accepted by: Bar_engraver (page 459), and Jump_engraver (page 484).

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 51), mark-event (page 55), music-event (page 56), and StreamEvent (page 60).

Accepted by: Mark_tracking_translator (page 489).

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 51), `music-event` (page 56), `StreamEvent` (page 60), and `structural-event` (page 60).

Accepted by: `Timing_translator` (page 511).

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 51), `music-event` (page 56), and `StreamEvent` (page 60).

Accepted by: `Balloon_engraver` (page 459).

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 51), layout-instruction-event (page 54), music-event (page 56), and StreamEvent (page 60).

Accepted by: Apply_output_engraver (page 457).

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

Arpeggiate this chord.

Syntax: *note*-\arpeggio

Event classes: arpeggio-event (page 51), music-event (page 56), and StreamEvent (page 60).

Accepted by: Arpeggio_engraver (page 457).

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: *note*x*y*, 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 51), music-event (page 56), script-event (page 58), and StreamEvent (page 60).

Accepted by: Beat_engraver (page 463), Beat_performer (page 464), Drum_note_performer (page 474), Note_performer (page 494), Script_engraver (page 501), and Toe_heel_engraver (page 512).

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 51), `music-event` (page 56), and `StreamEvent` (page 60).

Accepted by: `Timing_translator` (page 511).

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 51), `music-event` (page 56), and `StreamEvent` (page 60).

Accepted by: `Timing_translator` (page 511).

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 51), `music-event` (page 56), `rhythmic-event` (page 58), and `StreamEvent` (page 60).

Accepted by: `Figured_bass_engraver` (page 477).

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 51), `music-event` (page 56), `span-event` (page 59), and `StreamEvent` (page 60).

Accepted by: `Beam_engraver` (page 463), `Beam_performer` (page 463), and `Grace_beam_engraver` (page 480).

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 52), `music-event` (page 56), and `StreamEvent` (page 60).

Accepted by: `Auto_beam_engraver` (page 457), and `Grace_auto_beam_engraver` (page 480).

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 52), `music-event` (page 56), and `StreamEvent` (page 60).

Accepted by: `Bend_engraver` (page 465).

Properties:

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

types (list):
'(post-event bend-after-event event)

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

1.1.16 BendSpanEvent

Used to signal where a bend spanner starts and stops.

Event classes: bend-span-event (page 52), music-event (page 56), span-event (page 59), and StreamEvent (page 60).

Accepted by: Bend_spanner_engraver (page 465).

Properties:

name (symbol):
'BendSpanEvent

Name of this music object.

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

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

1.1.17 BreakDynamicSpanEvent

End an alignment spanner for dynamics here.

Event classes: break-dynamic-span-event (page 52), break-span-event (page 52), music-event (page 56), and StreamEvent (page 60).

Accepted by: Dynamic_engraver (page 475).

Properties:

name (symbol):
'BreakDynamicSpanEvent

Name of this music object.

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

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

1.1.18 BreathingEvent

A short span of silence that shortens the previous note.

Syntax: *note*\breathe

Event classes: breathing-event (page 52), music-event (page 56), and StreamEvent (page 60).

Accepted by: Breathing_sign_engraver (page 466), and Note_performer (page 494).

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 52), music-event (page 56), and StreamEvent (page 60).

Accepted by: Bar_engraver (page 459), Caesura_engraver (page 466), and Divisio_engraver (page 472).

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 ChordSlurEvent

Do not arpeggiate this chord. This is similar to See Section 1.1.58 [NonArpeggiatoEvent], page 21, with the acknowledgment that performing all notes simultaneously might be impossible.

Syntax: *note*-\chordSlur

Event classes: chord-slur-event (page 52), music-event (page 56), and StreamEvent (page 60).

Accepted by: Arpeggio_engraver (page 457).

Properties:

name (symbol):
'ChordSlurEvent

Name of this music object.

types (list):
'(post-event chord-slur-event event)

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

1.1.21 ClusterNoteEvent

A note that is part of a cluster.

Event classes: cluster-note-event (page 52), melodic-event (page 55), music-event (page 56), rhythmic-event (page 58), and StreamEvent (page 60).

Accepted by: Cluster_spanner_engraver (page 469).

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.

1.1.22 CodaMarkEvent

Add a coda mark.

Event classes: `coda-mark-event` (page 52), `music-event` (page 56), `StreamEvent` (page 60), and `structural-event` (page 60).

Accepted by: `Bar_engraver` (page 459), and `Mark_tracking_translator` (page 489).

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.

1.1.23 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 53), `music-event` (page 56), and `StreamEvent` (page 60).

Accepted by: `Extender_engraver` (page 476).

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.

1.1.24 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.

1.1.25 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.

1.1.26 CrescendoEvent

Begin or end a crescendo.

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

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

Event classes: `crescendo-event` (page 53), `music-event` (page 56), `span-dynamic-event` (page 59), `span-event` (page 59), and `StreamEvent` (page 60).

Accepted by: `Dynamic_engraver` (page 475), and `Dynamic_performer` (page 476).

Properties:

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

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

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

1.1.27 DalSegnoEvent

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

Event classes: dal-segno-event (page 53), music-event (page 56), StreamEvent (page 60), and structural-event (page 60).

Accepted by: Bar_engraver (page 459), Jump_engraver (page 484), and Volta_engraver (page 513).

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.

1.1.28 DecrescendoEvent

Begin or end a decrescendo.

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

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

Event classes: decrescendo-event (page 53), music-event (page 56), span-dynamic-event (page 59), span-event (page 59), and StreamEvent (page 60).

Accepted by: Dynamic_engraver (page 475), and Dynamic_performer (page 476).

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.

1.1.29 DoublePercentEvent

Used internally to signal double percent repeats.

Event classes: double-percent-event (page 53), music-event (page 56), rhythmic-event (page 58), and StreamEvent (page 60).

Accepted by: Double_percent_repeat_engraver (page 473).

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.

1.1.30 DurationLineEvent

Initiate a duration line.

Syntax: *note*\-

Event classes: duration-line-event (page 53), music-event (page 56), and StreamEvent (page 60).

Accepted by: Duration_line_engraver (page 474).

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.

1.1.31 EpisemaEvent

Begin or end an episema.

Event classes: episema-event (page 53), music-event (page 56), span-event (page 59), and StreamEvent (page 60).

Accepted by: Episema_engraver (page 476).

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.

1.1.32 Event

Unspecified 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.

`void` (boolean):
`#t`

If this property is `#t`, then the music expression is to be discarded by the top-level music handler.

1.1.33 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)`

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

1.1.34 ExtenderEvent

Extend lyrics.

Event classes: `extender-event` (page 53), `music-event` (page 56), and `StreamEvent` (page 60).

Accepted by: `Extender_engraver` (page 476).

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.

1.1.35 FineEvent

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

Event classes: `fine-event` (page 53), `music-event` (page 56), `StreamEvent` (page 60), and `structural-event` (page 60).

Accepted by: `Bar_engraver` (page 459), `Divisio_engraver` (page 472), `Jump_engraver` (page 484), `Timing_translator` (page 511), and `Volta_engraver` (page 513).

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.

1.1.36 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 54), `music-event` (page 56), `span-event` (page 59), and `StreamEvent` (page 60).

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.

1.1.37 FingeringEvent

Specify what finger to use for this note.

Event classes: fingering-event (page 54), music-event (page 56), and StreamEvent (page 60).

Accepted by: Fingering_engraver (page 478), Fretboard_engraver (page 479), and Tab_note_heads_engraver (page 507).

Properties:

name (symbol):
'FingeringEvent

Name of this music object.

types (list):
'(post-event fingering-event event)

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

1.1.38 FootnoteEvent

Footnote a grob.

Event classes: footnote-event (page 54), music-event (page 56), and StreamEvent (page 60).

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.

1.1.39 GlissandoEvent

Start a glissando on this note.

Event classes: glissando-event (page 54), music-event (page 56), and StreamEvent (page 60).

Accepted by: Glissando_engraver (page 480).

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.

1.1.40 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.

1.1.41 HarmonicEvent

Mark a note as harmonic.

Event classes: `harmonic-event` (page 54), `music-event` (page 56), and `StreamEvent` (page 60).

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.

1.1.42 HyphenEvent

A hyphen between lyric syllables.

Event classes: `hyphen-event` (page 54), `music-event` (page 56), and `StreamEvent` (page 60).

Accepted by: `Extender_engraver` (page 476), and `Hyphen_engraver` (page 483).

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.

1.1.43 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.

1.1.44 KeyChangeEvent

Change the key signature.

Syntax: \key *name scale*

Event classes: key-change-event (page 54), music-event (page 56), and StreamEvent (page 60).

Accepted by: Key_engraver (page 485), and Key_performer (page 486).

Properties:

name (symbol):
'KeyChangeEvent

Name of this music object.

to-relative-callback (procedure):
#<procedure at lily/define-music-types.scm:347:33 (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.

1.1.45 LabelEvent

Place a bookmarking label.

Event classes: label-event (page 54), music-event (page 56), and StreamEvent (page 60).

Accepted by: Paper_column_engraver (page 496).

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.

1.1.46 LaissezVibrerEvent

Don't damp this chord.

Syntax: *note*\laissezVibrer

Event classes: laissez-vibrer-event (page 54), music-event (page 56), and StreamEvent (page 60).

Accepted by: Laissez_vibrer_engraver (page 486).

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.

1.1.47 LigatureEvent

Start or end a ligature.

Event classes: ligature-event (page 55), music-event (page 56), span-event (page 59), and StreamEvent (page 60).

Accepted by: Kievan_ligature_engraver (page 486), Ligature_bracket_engraver (page 487), Mensural_ligature_engraver (page 491), and Vaticana_ligature_engraver (page 513).

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.

1.1.48 LineBreakEvent

Allow, forbid or force a line break.

Event classes: break-event (page 52), line-break-event (page 55), music-event (page 56), and StreamEvent (page 60).

Accepted by: Page_turn_engraver (page 495), and Paper_column_engraver (page 496).

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.

1.1.49 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.

1.1.50 LyricEvent

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

Event classes: lyric-event (page 55), music-event (page 56), rhythmic-event (page 58), and StreamEvent (page 60).

Accepted by: Extender_engraver (page 476), Lyric_engraver (page 487), and Lyric_performer (page 487).

Properties:

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

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

name (symbol):
'LyricEvent

Name of this music object.

types (list):
'(rhythmic-event lyric-event event)

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

1.1.51 MeasureCounterEvent

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

Event classes: measure-counter-event (page 55), music-event (page 56), span-event (page 59), and StreamEvent (page 60).

Accepted by: Measure_counter_engraver (page 489).

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.

1.1.52 MeasureSpannerEvent

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

Event classes: measure-spanner-event (page 55), music-event (page 56), span-event (page 59), and StreamEvent (page 60).

Accepted by: Measure_spanner_engraver (page 490).

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.

1.1.53 MultiMeasureArticulationEvent

Articulations on multi-measure rests.

Event classes: multi-measure-articulation-event (page 55), music-event (page 56), and StreamEvent (page 60).

Accepted by: Multi_measure_rest_engraver (page 492).

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.

1.1.54 MultiMeasureRestEvent

Used internally by MultiMeasureRestMusic to signal rests.

Event classes: general-rest-event (page 54), multi-measure-rest-event (page 55), music-event (page 56), rhythmic-event (page 58), and StreamEvent (page 60).

Accepted by: Current_chord_text_engraver (page 471), and Multi_measure_rest_engraver (page 492).

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.

1.1.55 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 parameter.

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

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

name (symbol):
'MultiMeasureRestMusic

Name of this music object.

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

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

1.1.56 MultiMeasureTextEvent

Texts on multi-measure rests.

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

Event classes: `multi-measure-text-event` (page 55), `music-event` (page 56), and `StreamEvent` (page 60).

Accepted by: `Multi_measure_rest_engraver` (page 492).

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.

1.1.57 Music

Unspecified music expression.

Properties:

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

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

`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.

`void` (boolean):
`#t`

If this property is `#t`, then the music expression is to be discarded by the top-level music handler.

1.1.58 NonArpeggiatoEvent

Do not arpeggiate this chord.

Syntax: *note*`-\nonArpeggiato`

Event classes: `music-event` (page 56), `non-arpeggiato-event` (page 56), and `StreamEvent` (page 60).

Accepted by: `Arpeggio_engraver` (page 457).

Properties:

`name` (symbol):
`'NonArpeggiatoEvent`

Name of this music object.

types (list):
'(post-event non-arpeggiato-event event)

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

1.1.59 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 1.1.33 [EventChord], page 12.

Event classes: melodic-event (page 55), music-event (page 56), note-event (page 56), rhythmic-event (page 58), and StreamEvent (page 60).

Accepted by: Beat_engraver (page 463), Beat_performer (page 464), Bend_spanner_engraver (page 465), Completion_heads_engraver (page 469), Current_chord_text_engraver (page 471), Drum_note_performer (page 474), Drum_notes_engraver (page 474), Finger_glide_engraver (page 477), Fretboard_engraver (page 479), Note_heads_engraver (page 494), Note_name_engraver (page 494), Note_performer (page 494), Part_combine_engraver (page 496), Phrasing_slur_engraver (page 497), Slur_engraver (page 503), and Tab_note_heads_engraver (page 507).

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.

1.1.60 NoteGroupingEvent

Start or stop grouping brackets.

Event classes: music-event (page 56), note-grouping-event (page 57), and StreamEvent (page 60).

Accepted by: Horizontal_bracket_engraver (page 482).

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.

1.1.61 OptionalMaterialEvent

Start or stop optional material.

Event classes: music-event (page 56), optional-material-event (page 57), span-event (page 59), and StreamEvent (page 60).

Accepted by: Optional_material_bracket_engraver (page 495).

Properties:

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

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

1.1.62 OttavaEvent

Start or stop an ottava bracket.

Event classes: music-event (page 56), ottava-event (page 57), and StreamEvent (page 60).

Accepted by: Ottava_spanner_engraver (page 495).

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.

1.1.63 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.

1.1.64 PageBreakEvent

Allow, forbid or force a page break.

Event classes: break-event (page 52), music-event (page 56), page-break-event (page 57), and StreamEvent (page 60).

Accepted by: Page_turn_engraver (page 495), and Paper_column_engraver (page 496).

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.

1.1.65 PageTurnEvent

Allow, forbid or force a page turn.

Event classes: break-event (page 52), music-event (page 56), page-turn-event (page 57), and StreamEvent (page 60).

Accepted by: Page_turn_engraver (page 495), and Paper_column_engraver (page 496).

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.

1.1.66 PartCombineEvent

Announce partcombine status change, such as aDue, soloI, or soloII, based on value of property part-combine-status.

Event classes: music-event (page 56), part-combine-event (page 57), and StreamEvent (page 60).

Accepted by: Part_combine_engraver (page 496).

Properties:

name (symbol):
'PartCombineEvent

Name of this music object.

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

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

1.1.67 PartCombineMusic

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

Properties:

`iterator-ctor` (procedure):
`ly:part-combine-iterator::constructor`

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

`length-callback` (procedure):
`ly:music-sequence::maximum-length-callback`

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

`name` (symbol):
`'PartCombineMusic`

Name of this music object.

`start-callback` (procedure):
`ly:music-sequence::minimum-start-callback`

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

`types` (list):
`'(part-combine-music)`

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

1.1.68 PartialEvent

An event announcing a partial measure.

Event classes: `music-event` (page 56), `partial-event` (page 57), and `StreamEvent` (page 60).

Accepted by: `Timing_translator` (page 511).

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.

1.1.69 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.

1.1.70 PercentEvent

Used internally to signal percent repeats.

Event classes: `music-event` (page 56), `percent-event` (page 57), and `StreamEvent` (page 60).

Accepted by: `Percent_repeat_engraver` (page 497).

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.

1.1.71 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.

1.1.72 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 56), `pes-or-flexa-event` (page 57), and `StreamEvent` (page 60).

Accepted by: `Vaticana_ligature_engraver` (page 513).

Properties:

`name` (symbol):
`'PesOrFlexaEvent`

Name of this music object.

`types` (list):
`'(pes-or-flexa-event event)`

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

1.1.73 PhrasingSlurEvent

Start or end phrasing slur.

Syntax: *note*`\(` and *note*`\)`

Event classes: `music-event` (page 56), `phrasing-slur-event` (page 57), `span-event` (page 59), and `StreamEvent` (page 60).

Accepted by: `Phrasing_slur_engraver` (page 497).

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.

1.1.74 PolymetricTimeSignatureEvent

An event created when setting a new time signature

Event classes: `music-event` (page 56), `polymetric-time-signature-event` (page 58), `StreamEvent` (page 60), and `time-signature-event` (page 61).

Accepted by: `Time_signature_engraver` (page 510), and `Timing_translator` (page 511).

Properties:

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

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

1.1.75 PolymetricTimeSignatureMusic

Set a new time signature

Properties:

duration (duration):
#<Duration 1 >
Duration of this note or lyric.

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.

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):
'PolymetricTimeSignatureMusic
Name of this music object.

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

1.1.76 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.

1.1.77 PropertySet

Set a context property.

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

Properties:

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

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

`name` (symbol):
`'PropertySet`

Name of this music object.

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

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

`untransposable` (boolean):
`#t`

If set, this music is not transposed.

1.1.78 PropertyUnset

Restore the default setting for a context property. See Section 1.1.77 [PropertySet], page 29.

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.

1.1.79 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.

1.1.80 ReferenceTimeSignatureEvent

An event created when setting a new time signature

Event classes: music-event (page 56), reference-time-signature-event (page 58), StreamEvent (page 60), and time-signature-event (page 61).

Accepted by: Time_signature_engraver (page 510), and Time_signature_performer (page 510).

Properties:

name (symbol):
'ReferenceTimeSignatureEvent

Name of this music object.

types (list):
'(event time-signature-event reference-time-signature-event)

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

1.1.81 ReferenceTimeSignatureMusic

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):
'ReferenceTimeSignatureMusic

Name of this music object.

types (list):
'(time-signature-music reference-time-signature-music)

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

1.1.82 RehearsalMarkEvent

Insert a rehearsal mark.

Syntax: `\mark` *marker*

Example: `\mark 3`

Event classes: `mark-event` (page 55), `music-event` (page 56), `rehearsal-mark-event` (page 58), and `StreamEvent` (page 60).

Accepted by: `Mark_tracking_translator` (page 489).

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.

1.1.83 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.

1.1.84 RelativeOctaveMusic

Music in which the assignment of octaves is complete.

Properties:

`iterator-ctor` (procedure):
`ly:music-wrapper-iterator::constructor`

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

`length-callback` (procedure):
`ly:music-wrapper::length-callback`

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

`name` (symbol):
`'RelativeOctaveMusic`

Name of this music object.

`start-callback` (procedure):
`ly:music-wrapper::start-callback`

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

`to-relative-callback` (procedure):
`ly:relative-octave-music::relative-callback`

How to transform a piece of music to relative pitches.

`types` (list):
`'(music-wrapper-music relative-octave-music)`

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

1.1.85 RepeatSlashEvent

Used internally to signal beat repeats.

Event classes: `music-event` (page 56), `repeat-slash-event` (page 58), `rhythmic-event` (page 58), and `StreamEvent` (page 60).

Accepted by: `Slash_repeat_engraver` (page 503).

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.

1.1.86 RepeatTieEvent

Ties for starting a second volta bracket.

Event classes: `music-event` (page 56), `repeat-tie-event` (page 58), and `StreamEvent` (page 60).

Accepted by: `Repeat_tie_engraver` (page 500).

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.

1.1.87 RestEvent

A Rest.

Syntax: `r4` for a quarter rest.

Event classes: `general-rest-event` (page 54), `music-event` (page 56), `rest-event` (page 58), `rhythmic-event` (page 58), and `StreamEvent` (page 60).

Accepted by: Completion_rest_engraver (page 470), Current_chord_text_engraver (page 471), Figured_bass_engraver (page 477), and Rest_engraver (page 500).

Properties:

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

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

name (symbol):
'RestEvent

Name of this music object.

types (list):
'(event rhythmic-event general-rest-event rest-event)

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

1.1.88 RevertProperty

The opposite of Section 1.1.63 [OverrideProperty], page 23: 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.

1.1.89 ScriptEvent

Add an articulation mark to a note.

Event classes: music-event (page 56), script-event (page 58), and StreamEvent (page 60).

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.

1.1.90 SectionEvent

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

Event classes: music-event (page 56), section-event (page 58), StreamEvent (page 60), and structural-event (page 60).

Accepted by: Bar_engraver (page 459), and Divisio_engraver (page 472).

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.

1.1.91 SectionLabelEvent

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

Event classes: music-event (page 56), section-label-event (page 58), and StreamEvent (page 60).

Accepted by: Mark_tracking_translator (page 489).

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.

1.1.92 SegnoMarkEvent

Add a segno mark or bar line.

Event classes: music-event (page 56), segno-mark-event (page 59), StreamEvent (page 60), and structural-event (page 60).

Accepted by: Bar_engraver (page 459), and Mark_tracking_translator (page 489).

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.

1.1.93 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.

1.1.94 SequentialAlternativeMusic

Repeat alternatives in sequence.

Syntax: `\alternative { `*`alternatives`*` }`

Properties:

`elements-callback` (procedure):
`#<procedure at lily/define-music-types.scm:698:30 (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.

1.1.95 SequentialMusic

Music expressions concatenated.

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

Properties:

`elements-callback` (procedure):
`#<procedure at lily/define-music-types.scm:711:30 (m)>`

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

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

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

`length-callback` (procedure):
`ly:music-sequence::cumulative-length-callback`

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

`name` (symbol):
`'SequentialMusic`

Name of this music object.

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

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

`types` (list):
`'(sequential-music)`

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

1.1.96 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.

1.1.97 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 56), `rhythmic-event` (page 58), `skip-event` (page 59), and `StreamEvent` (page 60).

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.

1.1.98 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.

1.1.99 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.

1.1.100 SlurEvent

Start or end slur.

Syntax: *note*(and *note*)

Event classes: music-event (page 56), slur-event (page 59), span-event (page 59), and StreamEvent (page 60).

Accepted by: Slur_engraver (page 503), and Slur_performer (page 503).

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.

1.1.101 SostenutoEvent

Depress or release sostenuto pedal.

Event classes: music-event (page 56), pedal-event (page 57), sostenuto-event (page 59), span-event (page 59), and StreamEvent (page 60).

Accepted by: Piano_pedal_engraver (page 498), and Piano_pedal_performer (page 499).

Properties:

name (symbol):
'SostenutoEvent

Name of this music object.

types (list):
'(post-event event pedal-event sostenuto-event)

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

1.1.102 SpacingSectionEvent

Start a new spacing section.

Event classes: music-event (page 56), spacing-section-event (page 59), and StreamEvent (page 60).

Accepted by: Spacing_engraver (page 503).

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.

1.1.103 SpanEvent

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

Event classes: music-event (page 56), span-event (page 59), and StreamEvent (page 60).

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.

1.1.104 StaffHighlightEvent

Start or stop a staff highlight.

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

Event classes: `music-event` (page 56), `span-event` (page 59), `staff-highlight-event` (page 59), and `StreamEvent` (page 60).

Accepted by: `Staff_highlight_engraver` (page 505).

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.

1.1.105 StaffSpanEvent

Start or stop a staff symbol.

Event classes: `music-event` (page 56), `span-event` (page 59), `staff-span-event` (page 59), and `StreamEvent` (page 60).

Accepted by: `Staff_symbol_engraver` (page 506).

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.

1.1.106 StringNumberEvent

Specify on which string to play this note.

Syntax: `\`*`number`*

Event classes: `music-event` (page 56), `StreamEvent` (page 60), and `string-number-event` (page 60).

Accepted by: `Bend_spanner_engraver` (page 465), `Fretboard_engraver` (page 479), and `Tab_note_heads_engraver` (page 507).

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.

1.1.107 StrokeFingerEvent

Specify with which finger to pluck a string.

Syntax: `\rightHandFinger` *text*

Event classes: `music-event` (page 56), `StreamEvent` (page 60), and `stroke-finger-event` (page 60).

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.

1.1.108 SustainEvent

Depress or release sustain pedal.

Event classes: `music-event` (page 56), `pedal-event` (page 57), `span-event` (page 59), `StreamEvent` (page 60), and `sustain-event` (page 61).

Accepted by: `Piano_pedal_engraver` (page 498), and `Piano_pedal_performer` (page 499).

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.

1.1.109 TempoChangeEvent

A metronome mark or tempo indication.

Event classes: `music-event` (page 56), `StreamEvent` (page 60), and `tempo-change-event` (page 61).

Accepted by: `Metronome_mark_engraver` (page 491), and `Tempo_performer` (page 508).

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.

1.1.110 TextMarkEvent

A textual mark.

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

Event classes: `music-event` (page 56), `StreamEvent` (page 60), and `text-mark-event` (page 61).

Accepted by: `Text_mark_engraver` (page 509).

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.

1.1.111 TextScriptEvent

Print text.

Event classes: `music-event` (page 56), `script-event` (page 58), `StreamEvent` (page 60), and `text-script-event` (page 61).

Accepted by: `Text_engraver` (page 509).

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.

1.1.112 TextSpanEvent

Start a text spanner, for example, an octavation.

Event classes: `music-event` (page 56), `span-event` (page 59), `StreamEvent` (page 60), and `text-span-event` (page 61).

Accepted by: `Text_spanner_engraver` (page 509).

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.

1.1.113 TieEvent

A tie.

Syntax: *note*-~

Event classes: music-event (page 56), StreamEvent (page 60), and tie-event (page 61).

Accepted by: Drum_note_performer (page 474), Note_performer (page 494), Tie_engraver (page 509), and Tie_performer (page 510).

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.

1.1.114 TimeScaledMusic

Multiply durations, as in tuplets.

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

Properties:

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

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

length-callback (procedure):
ly:music-wrapper::length-callback

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

name (symbol):
'TimeScaledMusic

Name of this music object.

start-callback (procedure):
ly:music-wrapper::start-callback

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

types (list):
'(time-scaled-music)

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

1.1.115 TransposedMusic

Music that has been transposed.

Properties:

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

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

`length-callback` (procedure):
`ly:music-wrapper::length-callback`

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

`name` (symbol):
`'TransposedMusic`

Name of this music object.

`start-callback` (procedure):
`ly:music-wrapper::start-callback`

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

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

How to transform a piece of music to relative pitches.

`types` (list):
`'(music-wrapper-music transposed-music)`

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

1.1.116 TremoloEvent

Unmeasured tremolo.

Event classes: `music-event` (page 56), `StreamEvent` (page 60), and `tremolo-event` (page 61).

Accepted by: `Stem_engraver` (page 506).

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.

1.1.117 TremoloRepeatedMusic

Repeated notes denoted by tremolo beams.

Properties:

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

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

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

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

`length-callback` (procedure):
`ly:calculated-sequential-music::length`

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

`name` (symbol):
`'TremoloRepeatedMusic`

Name of this music object.

`start-callback` (procedure):
`ly:calculated-sequential-music::start`

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

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

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

1.1.118 TremoloSpanEvent

Tremolo over two stems.

Event classes: `music-event` (page 56), `span-event` (page 59), `StreamEvent` (page 60), and `tremolo-span-event` (page 61).

Accepted by: `Chord_tremolo_engraver` (page 468).

Properties:

`name` (symbol):
`'TremoloSpanEvent`

Name of this music object.

`types` (list):
`'(event span-event tremolo-span-event)`

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

1.1.119 TrillSpanEvent

Start a trill spanner.

Event classes: `music-event` (page 56), `span-event` (page 59), `StreamEvent` (page 60), and `trill-span-event` (page 61).

Accepted by: `Trill_spanner_engraver` (page 512).

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.

1.1.120 TupletSpanEvent

Used internally to signal where tuplet brackets start and stop.

Event classes: music-event (page 56), span-event (page 59), StreamEvent (page 60), and tuplet-span-event (page 62).

Accepted by: Tuplet_engraver (page 512).

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.

1.1.121 UnaCordaEvent

Depress or release una-corda pedal.

Event classes: music-event (page 56), pedal-event (page 57), span-event (page 59), StreamEvent (page 60), and una-corda-event (page 62).

Accepted by: Piano_pedal_engraver (page 498), and Piano_pedal_performer (page 499).

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.

1.1.122 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.

1.1.123 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.

1.1.124 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.

1.1.125 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.

1.1.126 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 56), `StreamEvent` (page 60), `structural-event` (page 60), and `volta-repeat-end-event` (page 62).

Accepted by: `Divisio_engraver` (page 472), `Lyric_repeat_count_engraver` (page 487), `Repeat_acknowledge_engraver` (page 499), and `Signum_repetitionis_engraver` (page 502).

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.

1.1.127 VoltaRepeatStartEvent

Signal the start of a volta-style repeat.

Event classes: `music-event` (page 56), `StreamEvent` (page 60), `structural-event` (page 60), and `volta-repeat-start-event` (page 62).

Accepted by: Divisio_engraver (page 472), and Repeat_acknowledge_engraver (page 499).

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.

1.1.128 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.

1.1.129 VoltaSpanEvent

Used internally to signal where volta brackets start and stop.

Event classes: music-event (page 56), span-event (page 59), StreamEvent (page 60), and volta-span-event (page 62).

Accepted by: Volta_engraver (page 513).

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.

1.1.130 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.

1.1.131 VowelTransitionEvent

A vowel transition between lyric syllables.

Event classes: music-event (page 56), StreamEvent (page 60), and vowel-transition-event (page 62).

Accepted by: Hyphen_engraver (page 483).

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 475), and Dynamic_performer (page 476).

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 459), and Jump_engraver (page 484).

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 489).

1.2.4 alternative-event

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

Accepted by: Timing_translator (page 511).

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 459).

1.2.6 apply-output-event

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

Accepted by: Apply_output_engraver (page 457).

1.2.7 arpeggio-event

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

Accepted by: Arpeggio_engraver (page 457).

1.2.8 articulation-event

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

Accepted by: Beat_engraver (page 463), Beat_performer (page 464), Drum_note_performer (page 474), Note_performer (page 494), Script_engraver (page 501), and Toe_heel_engraver (page 512).

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 511).

1.2.10 bar-event

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

Accepted by: Timing_translator (page 511).

1.2.11 bass-figure-event

Music event type bass-figure-event is in music objects of type BassFigureEvent (page 4).

Accepted by: Figured_bass_engraver (page 477).

1.2.12 beam-event

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

Accepted by: Beam_engraver (page 463), Beam_performer (page 463), and Grace_beam_engraver (page 480).

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 457), and Grace_auto_beam_engraver (page 480).

1.2.14 bend-after-event

Music event type bend-after-event is in music objects of type BendAfterEvent (page 5).

Accepted by: Bend_engraver (page 465).

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 465).

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 475).

1.2.17 break-event

Music event type break-event is in music objects of type LineBreakEvent (page 18), PageBreakEvent (page 24), and PageTurnEvent (page 24).

Accepted by: Page_turn_engraver (page 495), and Paper_column_engraver (page 496).

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 6).

Accepted by: Breathing_sign_engraver (page 466), and Note_performer (page 494).

1.2.20 caesura-event

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

Accepted by: Bar_engraver (page 459), Caesura_engraver (page 466), and Divisio_engraver (page 472).

1.2.21 chord-slur-event

Music event type chord-slur-event is in music objects of type ChordSlurEvent (page 7).

Accepted by: Arpeggio_engraver (page 457).

1.2.22 cluster-note-event

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

Accepted by: Cluster_spanner_engraver (page 469).

1.2.23 coda-mark-event

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

Accepted by: Bar_engraver (page 459), and Mark_tracking_translator (page 489).

1.2.24 completize-extender-event

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

Accepted by: Extender_engraver (page 476).

1.2.25 crescendo-event

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

Accepted by: Dynamic_performer (page 476).

1.2.26 dal-segno-event

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

Accepted by: Bar_engraver (page 459), Jump_engraver (page 484), and Volta_engraver (page 513).

1.2.27 decrescendo-event

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

Accepted by: Dynamic_performer (page 476).

1.2.28 double-percent-event

Music event type double-percent-event is in music objects of type DoublePercentEvent (page 11).

Accepted by: Double_percent_repeat_engraver (page 473).

1.2.29 duration-line-event

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

Accepted by: Duration_line_engraver (page 474).

1.2.30 dynamic-event

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

Not accepted by any engraver or performer.

1.2.31 episema-event

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

Accepted by: Episema_engraver (page 476).

1.2.32 extender-event

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

Accepted by: Extender_engraver (page 476).

1.2.33 fine-event

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

Accepted by: Bar_engraver (page 459), Divisio_engraver (page 472), Jump_engraver (page 484), Timing_translator (page 511), and Volta_engraver (page 513).

1.2.34 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.

1.2.35 fingering-event

Music event type fingering-event is in music objects of type FingeringEvent (page 14).

Accepted by: Fingering_engraver (page 478), Fretboard_engraver (page 479), and Tab_note_heads_engraver (page 507).

1.2.36 footnote-event

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

Not accepted by any engraver or performer.

1.2.37 general-rest-event

Music event type general-rest-event is in music objects of type MultiMeasureRestEvent (page 20), and RestEvent (page 32).

Accepted by: Current_chord_text_engraver (page 471).

1.2.38 glissando-event

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

Accepted by: Glissando_engraver (page 480).

1.2.39 harmonic-event

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

Not accepted by any engraver or performer.

1.2.40 hyphen-event

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

Accepted by: Extender_engraver (page 476), and Hyphen_engraver (page 483).

1.2.41 key-change-event

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

Accepted by: Key_engraver (page 485), and Key_performer (page 486).

1.2.42 label-event

Music event type label-event is in music objects of type LabelEvent (page 17).

Accepted by: Paper_column_engraver (page 496).

1.2.43 laissez-vibrer-event

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

Accepted by: Laissez_vibrer_engraver (page 486).

1.2.44 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.

1.2.45 ligature-event

Music event type ligature-event is in music objects of type LigatureEvent (page 17).

Accepted by: Kievan_ligature_engraver (page 486), Ligature_bracket_engraver (page 487), Mensural_ligature_engraver (page 491), and Vaticana_ligature_engraver (page 513).

1.2.46 line-break-event

Music event type line-break-event is in music objects of type LineBreakEvent (page 18).

Not accepted by any engraver or performer.

1.2.47 lyric-event

Music event type lyric-event is in music objects of type LyricEvent (page 18).

Accepted by: Extender_engraver (page 476), Lyric_engraver (page 487), and Lyric_performer (page 487).

1.2.48 mark-event

Music event type mark-event is in music objects of type AdHocMarkEvent (page 1), and RehearsalMarkEvent (page 31).

Not accepted by any engraver or performer.

1.2.49 measure-counter-event

Music event type measure-counter-event is in music objects of type MeasureCounterEvent (page 19).

Accepted by: Measure_counter_engraver (page 489).

1.2.50 measure-spanner-event

Music event type measure-spanner-event is in music objects of type MeasureSpannerEvent (page 19).

Accepted by: Measure_spanner_engraver (page 490).

1.2.51 melodic-event

Music event type melodic-event is in music objects of type ClusterNoteEvent (page 7), and NoteEvent (page 22).

Not accepted by any engraver or performer.

1.2.52 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 492).

1.2.53 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 492).

1.2.54 multi-measure-text-event

Music event type multi-measure-text-event is in music objects of type MultiMeasureTextEvent (page 21).

Accepted by: Multi_measure_rest_engraver (page 492).

1.2.55 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 4), BeamEvent (page 5), BeamForbidEvent (page 5), BendAfterEvent (page 5), BendSpanEvent (page 6), BreakDynamicSpanEvent (page 6), BreathingEvent (page 6), CaesuraEvent (page 7), ChordSlurEvent (page 7), ClusterNoteEvent (page 7), CodaMarkEvent (page 8), CompletizeExtenderEvent (page 8), CrescendoEvent (page 9), DalSegnoEvent (page 10), DecrescendoEvent (page 10), DoublePercentEvent (page 11), DurationLineEvent (page 11), EpisemaEvent (page 11), ExtenderEvent (page 12), FineEvent (page 13), FingerGlideEvent (page 13), FingeringEvent (page 14), FootnoteEvent (page 14), GlissandoEvent (page 14), HarmonicEvent (page 15), HyphenEvent (page 15), KeyChangeEvent (page 16), LabelEvent (page 17), LaissezVibrerEvent (page 17), LigatureEvent (page 17), LineBreakEvent (page 18), LyricEvent (page 18), MeasureCounterEvent (page 19), MeasureSpannerEvent (page 19), MultiMeasureArticulationEvent (page 19), MultiMeasureRestEvent (page 20), MultiMeasureTextEvent (page 21), NonArpeggiatoEvent (page 21), NoteEvent (page 22), NoteGroupingEvent (page 22), OptionalMaterialEvent (page 23), OttavaEvent (page 23), PageBreakEvent (page 24), PageTurnEvent (page 24), PartCombineEvent (page 24), PartialEvent (page 25), PercentEvent (page 26), PesOrFlexaEvent (page 27), PhrasingSlurEvent (page 27), PolymetricTimeSignatureEvent (page 27), ReferenceTimeSignatureEvent (page 30), RehearsalMarkEvent (page 31), RepeatSlashEvent (page 32), RepeatTieEvent (page 32), RestEvent (page 32), ScriptEvent (page 33), SectionEvent (page 34), SectionLabelEvent (page 34), SegnoMarkEvent (page 34), SkipEvent (page 37), SlurEvent (page 38), SostenutoEvent (page 39), SpacingSectionEvent (page 39), SpanEvent (page 39), StaffHighlightEvent (page 40), StaffSpanEvent (page 40), StringNumberEvent (page 40), StrokeFingerEvent (page 41), SustainEvent (page 41), TempoChangeEvent (page 41), TextMarkEvent (page 42), TextScriptEvent (page 42), TextSpanEvent (page 42), TieEvent (page 43), TremoloEvent (page 44), TremoloSpanEvent (page 45), TrillSpanEvent (page 45), TupletSpanEvent (page 46), UnaCordaEvent (page 46), VoltaRepeatEndEvent (page 48), VoltaRepeatStartEvent (page 48), VoltaSpanEvent (page 49), and VowelTransitionEvent (page 50).

Not accepted by any engraver or performer.

1.2.56 non-arpeggiato-event

Music event type non-arpeggiato-event is in music objects of type NonArpeggiatoEvent (page 21).

Accepted by: Arpeggio_engraver (page 457).

1.2.57 note-event

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

Accepted by: Beat_engraver (page 463), Beat_performer (page 464), Bend_spanner_engraver (page 465), Completion_heads_engraver (page 469), Current_chord_text_engraver (page 471), Drum_note_performer (page 474), Drum_notes_engraver (page 474), Finger_glide_engraver (page 477), Fretboard_engraver (page 479), Note_heads_engraver (page 494), Note_name_engraver (page 494), Note_performer (page 494), Part_combine_engraver (page 496), Phrasing_slur_engraver (page 497), Slur_engraver (page 503), and Tab_note_heads_engraver (page 507).

1.2.58 note-grouping-event

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

Accepted by: Horizontal_bracket_engraver (page 482).

1.2.59 optional-material-event

Music event type optional-material-event is in music objects of type OptionalMaterialEvent (page 23).

Accepted by: Optional_material_bracket_engraver (page 495).

1.2.60 ottava-event

Music event type ottava-event is in music objects of type OttavaEvent (page 23).

Accepted by: Ottava_spanner_engraver (page 495).

1.2.61 page-break-event

Music event type page-break-event is in music objects of type PageBreakEvent (page 24).

Not accepted by any engraver or performer.

1.2.62 page-turn-event

Music event type page-turn-event is in music objects of type PageTurnEvent (page 24).

Not accepted by any engraver or performer.

1.2.63 part-combine-event

Music event type part-combine-event is in music objects of type PartCombineEvent (page 24).

Accepted by: Part_combine_engraver (page 496).

1.2.64 partial-event

Music event type partial-event is in music objects of type PartialEvent (page 25).

Accepted by: Timing_translator (page 511).

1.2.65 pedal-event

Music event type pedal-event is in music objects of type SostenutoEvent (page 39), SustainEvent (page 41), and UnaCordaEvent (page 46).

Not accepted by any engraver or performer.

1.2.66 percent-event

Music event type percent-event is in music objects of type PercentEvent (page 26).

Accepted by: Percent_repeat_engraver (page 497).

1.2.67 pes-or-flexa-event

Music event type pes-or-flexa-event is in music objects of type PesOrFlexaEvent (page 27).

Accepted by: Vaticana_ligature_engraver (page 513).

1.2.68 phrasing-slur-event

Music event type phrasing-slur-event is in music objects of type PhrasingSlurEvent (page 27).

Accepted by: Phrasing_slur_engraver (page 497).

1.2.69 polymetric-time-signature-event

Music event type polymetric-time-signature-event is in music objects of type PolymetricTimeSignatureEvent (page 27).

Accepted by: Time_signature_engraver (page 510), and Timing_translator (page 511).

1.2.70 reference-time-signature-event

Music event type reference-time-signature-event is in music objects of type ReferenceTimeSignatureEvent (page 30).

Accepted by: Time_signature_engraver (page 510), and Time_signature_performer (page 510).

1.2.71 rehearsal-mark-event

Music event type rehearsal-mark-event is in music objects of type RehearsalMarkEvent (page 31).

Accepted by: Mark_tracking_translator (page 489).

1.2.72 repeat-slash-event

Music event type repeat-slash-event is in music objects of type RepeatSlashEvent (page 32).

Accepted by: Slash_repeat_engraver (page 503).

1.2.73 repeat-tie-event

Music event type repeat-tie-event is in music objects of type RepeatTieEvent (page 32).

Accepted by: Repeat_tie_engraver (page 500).

1.2.74 rest-event

Music event type rest-event is in music objects of type RestEvent (page 32).

Accepted by: Completion_rest_engraver (page 470), Figured_bass_engraver (page 477), and Rest_engraver (page 500).

1.2.75 rhythmic-event

Music event type rhythmic-event is in music objects of type BassFigureEvent (page 4), ClusterNoteEvent (page 7), DoublePercentEvent (page 11), LyricEvent (page 18), MultiMeasureRestEvent (page 20), NoteEvent (page 22), RepeatSlashEvent (page 32), RestEvent (page 32), and SkipEvent (page 37).

Not accepted by any engraver or performer.

1.2.76 script-event

Music event type script-event is in music objects of type ArticulationEvent (page 3), ScriptEvent (page 33), and TextScriptEvent (page 42).

Not accepted by any engraver or performer.

1.2.77 section-event

Music event type section-event is in music objects of type SectionEvent (page 34).

Accepted by: Bar_engraver (page 459), and Divisio_engraver (page 472).

1.2.78 section-label-event

Music event type section-label-event is in music objects of type SectionLabelEvent (page 34).

Accepted by: Mark_tracking_translator (page 489).

1.2.79 segno-mark-event

Music event type segno-mark-event is in music objects of type SegnoMarkEvent (page 34).

Accepted by: Bar_engraver (page 459), and Mark_tracking_translator (page 489).

1.2.80 skip-event

Music event type skip-event is in music objects of type SkipEvent (page 37).

Not accepted by any engraver or performer.

1.2.81 slur-event

Music event type slur-event is in music objects of type SlurEvent (page 38).

Accepted by: Slur_engraver (page 503), and Slur_performer (page 503).

1.2.82 sostenuto-event

Music event type sostenuto-event is in music objects of type SostenutoEvent (page 39).

Accepted by: Piano_pedal_engraver (page 498), and Piano_pedal_performer (page 499).

1.2.83 spacing-section-event

Music event type spacing-section-event is in music objects of type SpacingSectionEvent (page 39).

Accepted by: Spacing_engraver (page 503).

1.2.84 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 475).

1.2.85 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), OptionalMaterialEvent (page 23), PhrasingSlurEvent (page 27), SlurEvent (page 38), SostenutoEvent (page 39), SpanEvent (page 39), StaffHighlightEvent (page 40), StaffSpanEvent (page 40), SustainEvent (page 41), TextSpanEvent (page 42), TremoloSpanEvent (page 45), TrillSpanEvent (page 45), TupletSpanEvent (page 46), UnaCordaEvent (page 46), and VoltaSpanEvent (page 49).

Not accepted by any engraver or performer.

1.2.86 staff-highlight-event

Music event type staff-highlight-event is in music objects of type StaffHighlightEvent (page 40).

Accepted by: Staff_highlight_engraver (page 505).

1.2.87 staff-span-event

Music event type staff-span-event is in music objects of type StaffSpanEvent (page 40).

Accepted by: Staff_symbol_engraver (page 506).

1.2.88 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 4), BeamEvent (page 5), BeamForbidEvent (page 5), BendAfterEvent (page 5), BendSpanEvent (page 6), BreakDynamicSpanEvent (page 6), BreathingEvent (page 6), CaesuraEvent (page 7), ChordSlurEvent (page 7), ClusterNoteEvent (page 7), CodaMarkEvent (page 8), CompletizeExtenderEvent (page 8), CrescendoEvent (page 9), DalSegnoEvent (page 10), DecrescendoEvent (page 10), DoublePercentEvent (page 11), DurationLineEvent (page 11), EpisemaEvent (page 11), ExtenderEvent (page 12), FineEvent (page 13), FingerGlideEvent (page 13), FingeringEvent (page 14), FootnoteEvent (page 14), GlissandoEvent (page 14), HarmonicEvent (page 15), HyphenEvent (page 15), KeyChangeEvent (page 16), LabelEvent (page 17), LaissezVibrerEvent (page 17), LigatureEvent (page 17), LineBreakEvent (page 18), LyricEvent (page 18), MeasureCounterEvent (page 19), MeasureSpannerEvent (page 19), MultiMeasureArticulationEvent (page 19), MultiMeasureRestEvent (page 20), MultiMeasureTextEvent (page 21), NonArpeggiatoEvent (page 21), NoteEvent (page 22), NoteGroupingEvent (page 22), OptionalMaterialEvent (page 23), OttavaEvent (page 23), PageBreakEvent (page 24), PageTurnEvent (page 24), PartCombineEvent (page 24), PartialEvent (page 25), PercentEvent (page 26), PesOrFlexaEvent (page 27), PhrasingSlurEvent (page 27), PolymetricTimeSignatureEvent (page 27), ReferenceTimeSignatureEvent (page 30), RehearsalMarkEvent (page 31), RepeatSlashEvent (page 32), RepeatTieEvent (page 32), RestEvent (page 32), ScriptEvent (page 33), SectionEvent (page 34), SectionLabelEvent (page 34), SegnoMarkEvent (page 34), SkipEvent (page 37), SlurEvent (page 38), SostenutoEvent (page 39), SpacingSectionEvent (page 39), SpanEvent (page 39), StaffHighlightEvent (page 40), StaffSpanEvent (page 40), StringNumberEvent (page 40), StrokeFingerEvent (page 41), SustainEvent (page 41), TempoChangeEvent (page 41), TextMarkEvent (page 42), TextScriptEvent (page 42), TextSpanEvent (page 42), TieEvent (page 43), TremoloEvent (page 44), TremoloSpanEvent (page 45), TrillSpanEvent (page 45), TupletSpanEvent (page 46), UnaCordaEvent (page 46), VoltaRepeatEndEvent (page 48), VoltaRepeatStartEvent (page 48), VoltaSpanEvent (page 49), and VowelTransitionEvent (page 50).

Not accepted by any engraver or performer.

1.2.89 string-number-event

Music event type string-number-event is in music objects of type StringNumberEvent (page 40).

Accepted by: Bend_spanner_engraver (page 465), Fretboard_engraver (page 479), and Tab_note_heads_engraver (page 507).

1.2.90 stroke-finger-event

Music event type stroke-finger-event is in music objects of type StrokeFingerEvent (page 41).

Not accepted by any engraver or performer.

1.2.91 structural-event

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 34), SegnoMarkEvent (page 34), VoltaRepeatEndEvent (page 48), and VoltaRepeatStartEvent (page 48).

Not accepted by any engraver or performer.

1.2.92 sustain-event

Music event type sustain-event is in music objects of type SustainEvent (page 41).

Accepted by: Piano_pedal_engraver (page 498), and Piano_pedal_performer (page 499).

1.2.93 tempo-change-event

Music event type tempo-change-event is in music objects of type TempoChangeEvent (page 41).

Accepted by: Metronome_mark_engraver (page 491), and Tempo_performer (page 508).

1.2.94 text-mark-event

Music event type text-mark-event is in music objects of type TextMarkEvent (page 42).

Accepted by: Text_mark_engraver (page 509).

1.2.95 text-script-event

Music event type text-script-event is in music objects of type TextScriptEvent (page 42).

Accepted by: Text_engraver (page 509).

1.2.96 text-span-event

Music event type text-span-event is in music objects of type TextSpanEvent (page 42).

Accepted by: Text_spanner_engraver (page 509).

1.2.97 tie-event

Music event type tie-event is in music objects of type TieEvent (page 43).

Accepted by: Drum_note_performer (page 474), Note_performer (page 494), Tie_engraver (page 509), and Tie_performer (page 510).

1.2.98 time-signature-event

Music event type time-signature-event is in music objects of type PolymetricTimeSignatureEvent (page 27), and ReferenceTimeSignatureEvent (page 30).

Not accepted by any engraver or performer.

1.2.99 tremolo-event

Music event type tremolo-event is in music objects of type TremoloEvent (page 44).

Accepted by: Stem_engraver (page 506).

1.2.100 tremolo-span-event

Music event type tremolo-span-event is in music objects of type TremoloSpanEvent (page 45).

Accepted by: Chord_tremolo_engraver (page 468).

1.2.101 trill-span-event

Music event type trill-span-event is in music objects of type TrillSpanEvent (page 45).

Accepted by: Trill_spanner_engraver (page 512).

1.2.102 tuplet-span-event

Music event type tuplet-span-event is in music objects of type TupletSpanEvent (page 46).

Accepted by: Tuplet_engraver (page 512).

1.2.103 una-corda-event

Music event type una-corda-event is in music objects of type UnaCordaEvent (page 46).

Accepted by: Piano_pedal_engraver (page 498), and Piano_pedal_performer (page 499).

1.2.104 volta-repeat-end-event

Music event type volta-repeat-end-event is in music objects of type VoltaRepeatEndEvent (page 48).

Accepted by: Divisio_engraver (page 472), Lyric_repeat_count_engraver (page 487), Repeat_acknowledge_engraver (page 499), and Signum_repetitionis_engraver (page 502).

1.2.105 volta-repeat-start-event

Music event type volta-repeat-start-event is in music objects of type VoltaRepeatStartEvent (page 48).

Accepted by: Divisio_engraver (page 472), and Repeat_acknowledge_engraver (page 499).

1.2.106 volta-span-event

Music event type volta-span-event is in music objects of type VoltaSpanEvent (page 49).

Accepted by: Volta_engraver (page 513).

1.2.107 vowel-transition-event

Music event type vowel-transition-event is in music objects of type VowelTransitionEvent (page 50).

Accepted by: Hyphen_engraver (page 483).

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` (a number list or a list of them)
: Beat structure for automatic beams, optionally with inner lists defining submeasure structure for automatic bar lines.

`bracket-start` (boolean)
: Start a bracket here.

  TODO: Use SpanEvents?

`bracket-stop` (boolean)
: Stop a bracket here.

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

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

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

`change-tag` (symbol)
: Tag identifying the musical scope of a context change. The change applies to the nearest enclosing music with this tag.

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

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

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

`color` (color)
: The color of a highlight.

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

`context-id` (string)
Name of context.

`context-type` (symbol)
Type of context.

`create-new` (boolean)
Create a fresh context.

`delta-step` (number)
How much should a fall change pitch?

`denominator` (rational number)
Denominator of a ratio.

`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` (index or 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 of numbers)
: 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` (rational number)
: Numerator of a ratio.

`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.

`pitch-approximate` (boolean)
: The `pitch` property approximates a pitch that cannot be known exactly, such as the highest note a singer can sing.

`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`.

`stroke-finger-digit` (non-negative, exact integer)
: Digit for stroke finger.

`stroke-finger-text` (markup)
: Markup expression to be printed for stroke finger.

`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.

`time-signature` (time signature)
: A time-signature specification. See the `\time` command.

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

`tonic` (pitch)
: Base of the scale.

`tremolo-type` (integer)
: Speed of tremolo, e.g., 16 for `c4:16`.

`trill-pitch` (pitch)
: Pitch of other note of the trill.

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

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

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

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

`value` (any type)
: Assignment value for a translation property.

`void` (boolean)
: If this property is `#t`, then the music expression is to be discarded by the top-level 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 544), ChordBracket (page 572), ChordSlur (page 574), InstrumentName (page 630), SpanBarStub (page 707), StaffGrouper (page 710), SystemStartBar (page 725), SystemStartBrace (page 726), SystemStartBracket (page 727), SystemStartSquare (page 728), and VerticalAlignment (page 753).

This context sets the following properties:

- Revert grob property extra-spacing-width in DynamicText (page 609),
- 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 609), to #f.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Staff (page 314).

Context ChoirStaff can contain ChoirStaff (page 69), ChordNames (page 100), Devnull (page 113), DrumStaff (page 113), Dynamics (page 133), FiguredBass (page 138), FretBoards (page 140), GrandStaff (page 142), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), NoteNames (page 250), OneStaff (page 254), PetrucciStaff (page 255), PianoStaff (page 281), RhythmicStaff (page 283), Staff (page 314), StaffGroup (page 327), TabStaff (page 370), VaticanaLyrics (page 393), and VaticanaStaff (page 419).

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

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Instrument_name_engraver (page 483)
: 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 630).

Span_arpeggio_engraver (page 504)
Make arpeggios, non-arpeggiato brackets, and vertical slurs spanning multiple staves.

Properties (read)

connectArpeggios (boolean)
If set, connect arpeggios across piano staff.

connectChordBrackets (boolean)
If set, connect chord brackets across piano staff.

connectChordSlurs (boolean)
If set, connect chord slurs across piano staff.

This engraver creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), and ChordSlur (page 574).

Span_bar_stub_engraver (page 504)
Make stubs for span bars in all contexts that the span bars cross.

This engraver creates the following layout object(s): SpanBarStub (page 707).

System_start_delimiter_engraver (page 507)
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 725), SystemStartBrace (page 726), SystemStartBracket (page 727), and SystemStartSquare (page 728).

Vertical_align_engraver (page 513)
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 710), and VerticalAlignment (page 753).

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 314).

This context creates the following layout object(s): BarLine (page 547), ChordSquare (page 576), DoublePercentRepeat (page 602), DoublePercentRepeatCounter (page 603), GridChordName (page 623), PercentRepeat (page 679), PercentRepeatCounter (page 680), StaffSymbol (page 713), SystemStartBar (page 725), SystemStartBrace (page 726), SystemStartBracket (page 727), SystemStartSquare (page 728), and VerticalAxisGroup (page 754).

This context sets the following properties:

- Set grob property font-size in BarLine (page 547), to 3.
- Set grob property hair-thickness in BarLine (page 547), to 2.
- Set grob property kern in BarLine (page 547), to 5.
- Set grob property line-positions in StaffSymbol (page 713), to :
  '(-13.5 13.5)
- Set grob property thickness in StaffSymbol (page 713), to 2.
- Set grob property thickness in SystemStartBar (page 725), 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 456)
: 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.

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Axis_group_engraver (page 458)
: 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 754).

Bar_engraver (page 459)
: 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 51), caesura-event (page 52), coda-mark-event (page 52), dal-segno-event (page 53), fine-event (page 53), section-event (page 58), and segno-mark-event (page 59),

Properties (read)

caesuraType (list)
: An alist

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

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

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

caesuraTypeTransform (procedure)
: An engraver callback taking three arguments and returning an alist of the same kind as caesuraType.

The first argument is the context.

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

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

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

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

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

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

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
: Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`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 time step.

`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 547).

`Chord_square_engraver` (page 467)
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 576).

`Current_chord_text_engraver` (page 471)
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 54), and `note-event` (page 56),

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 473)
Make double measure repeats.

Music types accepted: `double-percent-event` (page 53),

Properties (read)

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

`measureLength` (positive exact rational or +inf.0)
The musical length of the current measure.

`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 602), and `DoublePercentRepeatCounter` (page 603).

`Grid_chord_name_engraver` (page 481)
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 623).

Percent_repeat_engraver (page 497)
: Make whole measure repeats.

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

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 679), and PercentRepeatCounter (page 680).

Staff_symbol_engraver (page 506)
: Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): StaffSymbol (page 713).

System_start_delimiter_engraver (page 507)
: 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 725), SystemStartBrace (page 726), SystemStartBracket (page 727), and SystemStartSquare (page 728).

2.1.3 ChordGridScore

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

This context also accepts commands for the following context(s): Score (page 289), and Timing (page 289).

This context creates the following layout object(s): BreakAlignGroup (page 563), BreakAlignment (page 564), CenteredBarNumberLineSpanner (page 570), CodaMark (page 583), ControlPoint (page 587), ControlPolygon (page 588), Footnote (page 618), GraceSpacing (page 623), JumpScript (page 633), LeftEdge (page 643), MetronomeMark (page 658), NonMusicalPaperColumn (page 667), PaperColumn (page 677), Parentheses (page 678), RehearsalMark (page 685), SectionLabel (page 693), SegnoMark (page 695), SpacingSpanner (page 705), StaffGrouper (page 710), TextMark (page 731), VerticalAlignment (page 753), VoltaBracket (page 757), and VoltaBracketSpanner (page 758).

This context sets the following properties:

- Set context property additionalPitchPrefix to "add".
- 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:1756:0 (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 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 #<program>
      "scripts.raltcomma"))
 (caesura
  (text #<program>
      "scripts.caesura.straight"))
 (chantdoublebar
  (extra-spacing-width -1.0 . 0.0)
  (stencil . #<program>)
  (Y-offset . 0.0))
 (chantfullbar
  (extra-spacing-width -1.0 . 0.0)
  (stencil . #<program>)
  (Y-offset . 0.0))
 (chanthalfbar
  (extra-spacing-height . #<program>)
  (extra-spacing-width -1.0 . 0.0)
```

```
 (stencil . #<program>)
 (Y-offset . 0.0))
(chantquarterbar
 (extra-spacing-height . #<program>)
 (extra-spacing-width -1.0 . 0.0)
 (stencil . #<program>))
(comma (text #<program>
        "scripts.rcomma"))
(curvedcaesura
 (text #<program>
     "scripts.caesura.curved"))
(outsidecomma
 (outside-staff-priority . 40)
 (text #<program> "scripts.rcomma"))
(spacer (text #<program>))
(tickmark
 (outside-staff-priority . 40)
 (text #<program>
     "scripts.tickmark"))
(upbow (outside-staff-priority . 40)
     (text #<program>
         "scripts.uupbow"))
(varcomma
 (text #<program>
     "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
     "°")))))
 ((#<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
     "°")))
   (#<procedure super-markup (layout props arg)> "7")))
 ((#<Pitch e' >
  #<Pitch g' >
```

```
 #<Pitch bes' >
 #<Pitch des'' >
 #<Pitch ees'' >
 #<Pitch fis'' >
 #<Pitch aes'' >)
#<procedure line-markup (layout props args)>
((#<procedure super-markup (layout props arg)> "alt")))
((#<Pitch g' >)
 #<procedure line-markup (layout props args)>
 ((#<procedure super-markup (layout props arg)> "5")))
((#<Pitch g' > #<Pitch c'' >)
 #<procedure line-markup (layout props args)>
 ((#<procedure super-markup (layout props arg)> "5"))))
```

- Set 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 `#<procedure at lily/chord-name.scm:155:0 (pitch lowercase?)>`.
- Set context property `chordPrefixSpacer` to `0`.
- Set context property `chordRootNamer` to `#<procedure at lily/chord-name.scm:155:0 (pitch lowercase?)>`.
- 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:232:4 (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 `deprecatedBarCheckSynchronize` to `#f`.
- 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 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:
  '("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 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:232:4 (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-axis . 1)
 (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)
 (side-axis . 1)
 (direction . 1))
(altcomma
 (script-stencil feta "laltcomma" . "raltcomma")
 (quantize-position . #t)
 (padding . 0.2)
 (avoid-slur . ignore)
 (side-axis . 1)
 (direction . 1))
(bachschleifer
 (script-stencil feta "bachschleifer" . "bachschleifer")
 (no-ledgers . #f)
 (padding . 0.8)
 (length-fraction . 1.5)
 (avoid-slur . around)
 (side-axis . 0)
 (direction . -1)
 (staff-position
  .
  #<procedure at lily/output-lib.scm:1929:0 (grob)>))
(circulus
 (script-stencil feta "circulus" . "circulus")
 (side-relative-direction . -1)
 (avoid-slur . ignore)
 (padding . 0.2)
 (quantize-position . #t)
 (script-priority . -100)
 (side-axis . 1)
 (direction . 1))
(coda (script-stencil feta "coda" . "coda")
    (padding . 0.2)
    (avoid-slur . outside)
    (side-axis . 1)
    (direction . 1))
(comma (script-stencil feta "lcomma" . "rcomma")
     (quantize-position . #t)
     (padding . 0.2)
     (avoid-slur . ignore)
     (side-axis . 1)
     (direction . 1))
(downbow
 (script-stencil feta "ddownbow" . "udownbow")
 (padding . 0.2)
```

```
 (skyline-horizontal-padding . 0.2)
 (avoid-slur . around)
 (direction . 1)
 (side-axis . 1)
 (script-priority . 180))
(downmordent
 (script-stencil feta "downmordent" . "downmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(downprall
 (script-stencil feta "downprall" . "downprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(espressivo
 (avoid-slur . around)
 (padding . 0.2)
 (script-stencil feta "espr" . "espr")
 (side-axis . 1)
 (side-relative-direction . -1))
(fermata
 (script-stencil feta "dfermata" . "ufermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(flageolet
 (script-stencil feta "flageolet" . "flageolet")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1)
 (side-axis . 1)
 (script-priority . 50))
(halfopen
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil feta "halfopen" . "halfopen")
 (side-axis . 1)
 (direction . 1))
(halfopenvertical
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil feta "halfopenvertical" . "halfopenvertical")
 (side-axis . 1)
 (direction . 1))
(haydnturn
 (script-stencil feta "haydnturn" . "haydnturn")
```

```
 (padding . 0.2)
 (avoid-slur . inside)
 (side-axis . 1)
 (direction . 1))
(heel (script-stencil feta "upedalheel" . "upedalheel")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . 1))
(heelcircle
 (script-stencil feta "pedalheelcircle" . "pedalheelcircle")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(henzelongfermata
 (script-stencil
  feta
  "dhenzelongfermata"
  .
  "uhenzelongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(henzeshortfermata
 (script-stencil
  feta
  "dhenzeshortfermata"
  .
  "uhenzeshortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(ictus (script-stencil feta "ictus" . "ictus")
     (side-relative-direction . -1)
     (quantize-position . #t)
     (avoid-slur . ignore)
     (padding . 0.2)
     (script-priority . -100)
     (side-axis . 1)
     (direction . -1))
(lheel (script-stencil feta "upedalheel" . "upedalheel")
     (padding . 0.2)
     (avoid-slur . around)
     (side-axis . 1)
     (direction . -1))
```

```
(lineprall
 (script-stencil feta "lineprall" . "lineprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(longfermata
 (script-stencil feta "dlongfermata" . "ulongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(ltoe (script-stencil feta "upedaltoe" . "upedaltoe")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . -1))
(marcato
 (script-stencil feta "dmarcato" . "umarcato")
 (padding . 0.2)
 (avoid-slur . inside)
 (quantize-position . #t)
 (side-axis . 1)
 (side-relative-direction . -1))
(mordent
 (script-stencil feta "mordent" . "mordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(open (avoid-slur . outside)
    (padding . 0.2)
    (script-stencil feta "open" . "open")
    (side-axis . 1)
    (direction . 1))
(outsidecomma
 (avoid-slur . around)
 (direction . 1)
 (padding . 0.2)
 (side-axis . 1)
 (script-stencil feta "lcomma" . "rcomma"))
(portato
 (script-stencil feta "uportato" . "dportato")
 (avoid-slur . around)
 (padding . 0.45)
 (side-axis . 1)
 (side-relative-direction . -1))
(prall (script-stencil feta "prall" . "prall")
     (padding . 0.2)
     (avoid-slur . around)
```

```
    (side-axis . 1)
    (direction . 1))
(pralldown
 (script-stencil feta "pralldown" . "pralldown")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(prallmordent
 (script-stencil feta "prallmordent" . "prallmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(prallprall
 (script-stencil feta "prallprall" . "prallprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(prallup
 (script-stencil feta "prallup" . "prallup")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(reverseturn
 (script-stencil feta "reverseturn" . "reverseturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (side-axis . 1)
 (direction . 1))
(rheel (script-stencil feta "dpedalheel" . "dpedalheel")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . 1))
(rtoe (script-stencil feta "dpedaltoe" . "dpedaltoe")
   (padding . 0.2)
   (avoid-slur . around)
   (side-axis . 1)
   (direction . 1))
(segno (script-stencil feta "segno" . "segno")
    (padding . 0.2)
    (avoid-slur . outside)
    (side-axis . 1)
    (direction . 1))
(semicirculus
 (script-stencil feta "dsemicirculus" . "dsemicirculus")
 (side-relative-direction . -1)
 (quantize-position . #t)
 (avoid-slur . ignore)
```

```
 (padding . 0.2)
 (script-priority . -100)
 (side-axis . 1)
 (direction . 1))
(shortfermata
 (script-stencil feta "dshortfermata" . "ushortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(signumcongruentiae
 (script-stencil
  feta
  "dsignumcongruentiae"
  .
  "usignumcongruentiae")
 (padding . 0.2)
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(slashturn
 (script-stencil feta "slashturn" . "slashturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (side-axis . 1)
 (direction . 1))
(snappizzicato
 (script-stencil feta "snappizzicato" . "snappizzicato")
 (padding . 0.2)
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(staccatissimo
 (avoid-slur . inside)
 (quantize-position . #t)
 (script-stencil feta "dstaccatissimo" . "ustaccatissimo")
 (padding . 0.2)
 (skyline-horizontal-padding . 0.1)
 (side-axis . 1)
 (side-relative-direction . -1)
 (toward-stem-shift . 1.0)
 (toward-stem-shift-in-column . 0.0))
(staccato
 (script-stencil feta "staccato" . "staccato")
 (side-axis . 1)
 (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)
 (side-axis . 1)
 (direction . 1))
(tenuto
 (script-stencil feta "tenuto" . "tenuto")
 (quantize-position . #t)
 (avoid-slur . inside)
 (padding . 0.2)
 (script-priority . -50)
 (side-axis . 1)
 (side-relative-direction . -1))
(toe (script-stencil feta "dpedaltoe" . "dpedaltoe")
   (padding . 0.2)
   (avoid-slur . around)
   (side-axis . 1)
   (direction . 1))
(trill (script-stencil feta "trill" . "trill")
    (direction . 1)
    (padding . 0.2)
    (avoid-slur . outside)
    (side-axis . 1)
    (script-priority . 150))
(turn (script-stencil feta "turn" . "turn")
    (avoid-slur . inside)
    (padding . 0.2)
    (side-axis . 1)
    (direction . 1))
(upbow (script-stencil feta "dupbow" . "uupbow")
    (avoid-slur . around)
    (padding . 0.2)
    (direction . 1)
    (side-axis . 1)
    (script-priority . 180))
(upmordent
 (script-stencil feta "upmordent" . "upmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(upprall
 (script-stencil feta "upprall" . "upprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(varcoda
```

```
 (script-stencil feta "varcoda" . "varcoda")
 (padding . 0.2)
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(varcomma
 (script-stencil feta "lvarcomma" . "rvarcomma")
 (quantize-position . #t)
 (padding . 0.2)
 (avoid-slur . ignore)
 (side-axis . 1)
 (direction . 1))
(varheel
 (script-stencil feta "dpedalheel" . "dpedalheel")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(vartoe
 (script-stencil feta "upedaltoe" . "upedaltoe")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(verylongfermata
 (script-stencil feta "dverylongfermata" . "uverylongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(veryshortfermata
 (script-stencil
  feta
  "dveryshortfermata"
  .
  "uveryshortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (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 submeasureBarsEnabled to #f.
- Set context property submeasureBarType to "!".
- 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 tempoCountPrecision to 1/4.
- Set context property tieWaitForNote to #f.
- Set context property timeSignatureSettings to:
  ```
  '(((2 . 2) (beamExceptions (end (1/32 8 8 8 8))))
   ((2 . 8) (beamExceptions (end (1/8 2))))
   ((3 . 2) (beamExceptions (end (1/32 8 8 8 8 8 8))))
   ((3 . 4) (beamExceptions (end (1/8 6) (1/12 3 3 3))))
   ((3 . 8) (beamExceptions (end (1/8 3))))
   ((4 . 2) (beamExceptions (end (1/16 4 4 4 4 4 4 4 4))))
   ((4 . 4) (beamExceptions (end (1/8 4 4) (1/12 3 3 3 3))))
   ((4 . 8) (beatStructure 2 2))
   ((6 . 4) (beamExceptions (end (1/16 4 4 4 4 4 4))))
   ((9 . 4) (beamExceptions (end (1/32 8 8 8 8 8 8 8 8))))
   ((12 . 4)
    (beamExceptions (end (1/32 8 8 8 8 8 8 8 8 8 8 8 8))))
   ((5 . 8) (beatStructure 3 2))
   ((8 . 8) (beatStructure 3 3 2)))
  ```
- Set context property timeSignature to:
  ```
  '(4 . 4)
  ```
- 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 314).

Context ChordGridScore can contain ChoirStaff (page 69), ChordGrid (page 71), ChordNames (page 100), Devnull (page 113), DrumStaff (page 113), Dynamics (page 133), FiguredBass (page 138), FretBoards (page 140), GrandStaff (page 142), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), NoteNames (page 250), OneStaff (page 254), PetrucciStaff (page 255), PianoStaff (page 281), RhythmicStaff (page 283), Staff (page 314), StaffGroup (page 327), TabStaff (page 370), VaticanaLyrics (page 393), and VaticanaStaff (page 419).

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

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Beam_collision_engraver (page 463)
: Help beams avoid colliding with notes and clefs in other voices.

Break_align_engraver (page 465)
: 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 563), BreakAlignment (page 564), and LeftEdge (page 643).

Centered_bar_number_align_engraver (page 467)
: 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 570).

Concurrent_hairpin_engraver (page 470)
: Collect concurrent hairpins.

Footnote_engraver (page 478)
: Create footnote texts.

  This engraver creates the following layout object(s): Footnote (page 618).

Grace_spacing_engraver (page 481)
: 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 623).

Jump_engraver (page 484)
: 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 505), also needs to be there so that marks appear at the intended Y location.

Music types accepted: ad-hoc-jump-event (page 51), dal-segno-event (page 53), and fine-event (page 53),

Properties (read)

codaMarkCount (non-negative, exact integer)
: Updated at the end of each time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 633).

Mark_engraver (page 488)
: 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 505), 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 489). 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 583), RehearsalMark (page 685), SectionLabel (page 693), and SegnoMark (page 695).

Mark_tracking_translator (page 489)
: This translator chooses which marks Mark_engraver should engrave.

  Music types accepted: ad-hoc-mark-event (page 51), coda-mark-event (page 52), rehearsal-mark-event (page 58), section-label-event (page 58), and segno-mark-event (page 59),

  Properties (read)

  codaMarkCount (non-negative, exact integer)
  : Updated at the end of each time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 491)
: 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 Staff_collecting_engraver (page 505).

Music types accepted: tempo-change-event (page 61),

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 658).

Paper_column_engraver (page 496)
: 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 52), and `label-event` (page 54),

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 667), and `PaperColumn` (page 677).

`Parenthesis_engraver` (page 496)
: Parenthesize objects whose `parenthesize` property is `#t`.

This engraver creates the following layout object(s): `Parentheses` (page 678).

`Repeat_acknowledge_engraver` (page 499)
: This engraver augments `repeatCommands` with `start-repeat` and `end-repeat` entries based on received events. This is internal behavior that allows simplifying other engravers that must support both `\repeat volta` and manual repeats.

This engraver also resets `repeatCommands` at the beginning of each time step. This is user-facing behavior: it allows setting a value for the current time step simply with `\set` rather than requiring `\once \set`.

Music types accepted: `volta-repeat-end-event` (page 62), and `volta-repeat-start-event` (page 62),

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 502)
: 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 587), and `ControlPolygon` (page 588).

`Spacing_engraver` (page 503)
: Make a `SpacingSpanner` and do bookkeeping of shortest starting and playing notes.

Music types accepted: `spacing-section-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.).

`proportionalNotationDuration` (non-negative exact rational or +inf.0)
: Global override for shortest-playing duration. This is used for switching on proportional notation.

This engraver creates the following layout object(s): `SpacingSpanner` (page 705).

`Spanner_tracking_engraver` (page 504)
: 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 505)
: 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 506)
: This engraver ensures that stanza numbers are neatly aligned.

`Text_mark_engraver` (page 509)
: Engraves arbitrary textual marks.

Music types accepted: `text-mark-event` (page 61),

Properties (read)

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

This engraver creates the following layout object(s): `TextMark` (page 731).

`Timing_translator` (page 511)
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 51), `bar-check-event` (page 51), `bar-event` (page 51), `fine-event` (page 53), `partial-event` (page 57), and `polymetric-time-signature-event` (page 58),

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.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`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 exact rational or +inf.0)
The musical length of the current measure.

`measurePosition` (moment)
The current point within the measure.

`timeSignature` (time signature)
A time-signature specification. See the `\time` command.

Properties (write)

`alternativeNumber` (non-negative, exact integer)
When set, the first volta number for the current `\alternative` element. Not set outside of alternatives.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`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 exact rational or +inf.0)
The musical length of the current measure.

`measurePosition` (moment)
The current point within the measure.

`measureStartNow` (boolean)
True at the beginning of a measure.

`timeSignature` (time signature)
A time-signature specification. See the `\time` command.

`Tweak_engraver` (page 513)
Read the `tweaks` property from the originating event, and set properties.

`Vertical_align_engraver` (page 513)
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 710), and `VerticalAlignment` (page 753).

`Volta_engraver` (page 513)
Make volta brackets.

Music types accepted: `dal-segno-event` (page 53), `fine-event` (page 53), and `volta-span-event` (page 62),

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.

This engraver creates the following layout object(s): `VoltaBracket` (page 757), and `VoltaBracketSpanner` (page 758).

2.1.4 ChordNames

Typesets chord names.

This context also accepts commands for the following context(s): Staff (page 314).

This context creates the following layout object(s): ChordName (page 573), StaffSpacing (page 712), and VerticalAxisGroup (page 754).

This context sets the following properties:

- Set grob property font-size in Parentheses (page 678), to 1.5.
- Set grob property nonstaff-nonstaff-spacing.padding in VerticalAxisGroup (page 754), to 0.5.
- Set grob property nonstaff-relatedstaff-spacing.padding in VerticalAxisGroup (page 754), to 0.5.
- Set grob property remove-empty in VerticalAxisGroup (page 754), to #t.
- Set grob property remove-first in VerticalAxisGroup (page 754), to #t.
- Set grob property staff-affinity in VerticalAxisGroup (page 754), 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 456)
: 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.

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Axis_group_engraver (page 458)
: 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 754).

`Chord_name_engraver` (page 467)
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 573).

`Current_chord_text_engraver` (page 471)
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 54), and `note-event` (page 56),

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.

`Pure_from_neighbor_engraver` (page 499)
Coordinates items that get their pure heights from their neighbors.

`Separating_line_group_engraver` (page 502)
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 712).

2.1.5 CueVoice

A voice context used to render notes of a reduced size, intended primarily for adding cue notes to a staff. Usually left to be created implicitly.

This context also accepts commands for the following context(s): `Voice` (page 444).

This context creates the following layout object(s): `ApproximatePitchNoteHead` (page 542), `Arpeggio` (page 544), `Beam` (page 557), `BendAfter` (page 560), `BreathingSign` (page 565), `ChordBracket` (page 572), `ChordSlur` (page 574), `ClusterSpanner` (page 582), `ClusterSpannerBeacon` (page 582), `CombineTextScript` (page 585), `Dots` (page 600), `DoublePercentRepeat` (page 602), `DoublePercentRepeatCounter` (page 603), `DoubleRepeatSlash` (page 604), `DynamicLineSpanner` (page 607), `DynamicText` (page 609), `DynamicTextSpanner` (page 611), `FingerGlideSpanner` (page 613), `Fingering` (page 615), `Flag` (page 617), `Glissando` (page 622), `Hairpin` (page 626), `InstrumentSwitch` (page 631), `LaissezVibrerTie` (page 641), `LaissezVibrerTieColumn` (page 642), `LigatureBracket` (page 646), `MultiMeasureRest` (page 660), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestScript` (page 664), `MultiMeasureRestText` (page 665), `NoteColumn` (page 669), `NoteHead` (page 670), `NoteSpacing` (page 672), `PercentRepeat` (page 679), `PercentRepeatCounter` (page 680), `PhrasingSlur` (page 682), `RepeatSlash` (page 687), `RepeatTie` (page 688), `RepeatTieColumn` (page 689), `Rest` (page 689), `Script` (page 691), `ScriptColumn` (page 692), `Slur` (page 700), `Stem` (page 715), `StemStub` (page 717), `StemTremolo` (page 717), `StringNumber` (page 718), `StrokeFinger` (page 720), `TextScript` (page 733), `TextSpanner` (page 735), `Tie` (page 737), `TieColumn` (page 739), `TrillPitchAccidental` (page 742), `TrillPitchGroup` (page 743), `TrillPitchHead` (page 744), `TrillPitchParentheses` (page 745), `TrillSpanner` (page 746), `TupletBracket` (page 747), `TupletNumber` (page 749), and `VoiceFollower` (page 756).

This context sets the following properties:

- Set context property `fontSize` to `-4`.
- Set grob property `beam-thickness` in `Beam` (page 557), to `0.35`.
- Set grob property `beam-thickness` in `StemTremolo` (page 717), to `0.35`.
- Set grob property `ignore-ambitus` in `NoteHead` (page 670), to `#t`.
- Set grob property `length-fraction` in `Beam` (page 557), to `0.6299605249474366`.
- Set grob property `length-fraction` in `Stem` (page 715), 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):

`Apply_output_engraver` (page 457)
: Apply a procedure to any grob acknowledged.

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

`Arpeggio_engraver` (page 457)
: Create arpeggiato and non-arpeggiato symbols.

  Music types accepted: `arpeggio-event` (page 51), `chord-slur-event` (page 52), and `non-arpeggiato-event` (page 56),

  This engraver creates the following layout object(s): `Arpeggio` (page 544), `ChordBracket` (page 572), and `ChordSlur` (page 574).

`Auto_beam_engraver` (page 457)
: Generate beams based on measure characteristics and observed Stems. Uses `beatBase`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through `Stem_engraver` (page 506), properties `stemLeftBeamCount` and `stemRightBeamCount`.

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

  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.

  `beamExceptions` (list)
  : An alist of exceptions to auto-beam 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.

  `beatBase` (positive exact rational or +inf.0)
  : The musical length corresponding to one unit of `beatStructure`.

  `beatStructure` (number list)
  : A sequence describing the length of each beat in the measure in units of `beatBase`.

  `subdivideBeams` (boolean)
  : If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

  This engraver creates the following layout object(s): `Beam` (page 557).

`Beam_engraver` (page 463)
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

  Properties (read)

  `beamMelismaBusy` (boolean)
  : Signal if a beam is present.

  `beatBase` (positive exact rational or +inf.0)
  : The musical length corresponding to one unit of `beatStructure`.

beatStructure (number list)
A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Bend_engraver (page 465)
Create fall spanners.

Music types accepted: bend-after-event (page 52),

Properties (read)

currentBarLine (graphical (layout) object)
Set to the BarLine that Bar_engraver has created in the current time step.

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 560).

Breathing_sign_engraver (page 466)
Notate breath marks.

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

Properties (read)

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

This engraver creates the following layout object(s): BreathingSign (page 565).

Chord_tremolo_engraver (page 468)
Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 61),

This engraver creates the following layout object(s): Beam (page 557).

Cluster_spanner_engraver (page 469)
Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 52),

This engraver creates the following layout object(s): ClusterSpanner (page 582), and ClusterSpannerBeacon (page 582).

Dots_engraver (page 473)
Create Dots (page 600), objects for rhythmic-head-interface (page 827)s.

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

Double_percent_repeat_engraver (page 473)
Make double measure repeats.

Music types accepted: double-percent-event (page 53),

Properties (read)

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

`measureLength` (positive exact rational or +inf.0)
The musical length of the current measure.

`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 602), and `DoublePercentRepeatCounter` (page 603).

`Dynamic_align_engraver` (page 475)
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 607).

`Dynamic_engraver` (page 475)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 50), `break-dynamic-span-event` (page 52), and `span-dynamic-event` (page 59),

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 609), `DynamicTextSpanner` (page 611), and `Hairpin` (page 626).

`Finger_glide_engraver` (page 477)
Engraver to print a line between two `Fingering`, `StringNumber` or `StrokeFinger` grobs.

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

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

`Fingering_engraver` (page 478)
Create fingering scripts.

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

This engraver creates the following layout object(s): `Fingering` (page 615).

`Font_size_engraver` (page 478)
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 478)
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 480)
Engrave glissandi.

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

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 `'()` defaults to `'((0 . 0) (1 . 1) ... (n . n))`, where *n* is the minimum number of note heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s): `Glissando` (page 622).

`Grace_auto_beam_engraver` (page 480)
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 52),

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 557).

Grace_beam_engraver (page 480)
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 51),

Properties (read)

beamMelismaBusy (boolean)
Signal if a beam is present.

beatBase (positive exact rational or +inf.0)
The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Grace_engraver (page 481)
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 482)
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 483)
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 631).

`Laissez_vibrer_engraver` (page 486)
Create laissez vibrer items.

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

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 641), and `LaissezVibrerTieColumn` (page 642).

`Ligature_bracket_engraver` (page 487)
Handle `Ligature_events` by engraving `Ligature` brackets.

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

This engraver creates the following layout object(s): `LigatureBracket` (page 646).

`Multi_measure_rest_engraver` (page 492)
Engrave multi-measure rests that are produced with '`R`'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the `MultiMeasureRest` (page 660).

Music types accepted: `multi-measure-articulation-event` (page 55), `multi-measure-rest-event` (page 55), and `multi-measure-text-event` (page 55),

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 multi-measure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 660), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestScript` (page 664), and `MultiMeasureRestText` (page 665).

`New_fingering_engraver` (page 493)
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 615), `Script` (page 691), `StringNumber` (page 718), and `StrokeFinger` (page 720).

`Note_head_line_engraver` (page 493)
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 756).

`Note_heads_engraver` (page 494)
Generate note heads.

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

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): `ApproximatePitchNoteHead` (page 542), and `NoteHead` (page 670).

`Note_spacing_engraver` (page 495)
Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

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

`Part_combine_engraver` (page 496)
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted: `note-event` (page 56), and `part-combine-event` (page 57),

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 585).

`Percent_repeat_engraver` (page 497)
Make whole measure repeats.

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

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 679), and `PercentRepeatCounter` (page 680).

`Phrasing_slur_engraver` (page 497)
Print phrasing slurs. Similar to `Slur_engraver` (page 503).

Music types accepted: `note-event` (page 56), and `phrasing-slur-event` (page 57),

This engraver creates the following layout object(s): `PhrasingSlur` (page 682).

`Pitched_trill_engraver` (page 499)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 742), `TrillPitchGroup` (page 743), `TrillPitchHead` (page 744), and `TrillPitchParentheses` (page 745).

`Repeat_tie_engraver` (page 500)
Create repeat ties.

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

This engraver creates the following layout object(s): `RepeatTie` (page 688), and `RepeatTieColumn` (page 689).

`Rest_engraver` (page 500)
Engrave rests.

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

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 689).

`Rhythmic_column_engraver` (page 501)
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 669).

`Script_column_engraver` (page 501)
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 692).

`Script_engraver` (page 501)
Handle note scripted articulations.

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

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 691).

`Slash_repeat_engraver` (page 503)
Make beat repeats.

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

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 604), and `RepeatSlash` (page 687).

`Slur_engraver` (page 503)
Build slur grobs from slur events.

Music types accepted: `note-event` (page 56), and `slur-event` (page 59),

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 700).

`Spanner_break_forbid_engraver` (page 504)
Forbid breaks in certain spanners.

`Stem_engraver` (page 506)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 61),

Properties (read)

`currentBarLine` (graphical (layout) object)
Set to the `BarLine` that `Bar_engraver` has created in the current time step.

`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 617), `Stem` (page 715), `StemStub` (page 717), and `StemTremolo` (page 717).

`Text_engraver` (page 509)
Create text scripts.

Music types accepted: `text-script-event` (page 61),

This engraver creates the following layout object(s): `TextScript` (page 733).

`Text_spanner_engraver` (page 509)
Create text spanner from an event.

Music types accepted: `text-span-event` (page 61),

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 735).

`Tie_engraver` (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 61),

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 737), and `TieColumn` (page 739).

`Toe_heel_engraver` (page 512)
Read the `toeHeelStyle` context property and use it to style `\rtoe` and its siblings, based on the data in the `toe-heel-styles` alist.

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

Properties (read)

`toeHeelStyle` (symbol)
The style for the glyph shape and behavior of `\rtoe` and siblings. Possible values are `default`, `standard`, `reversed`, `circleheels`, and `below`. If not set (the default), use value `default`.

`Trill_spanner_engraver` (page 512)
Create trill spanners.

Music types accepted: `trill-span-event` (page 61),

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 746).

`Tuplet_engraver` (page 512)

Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 62),

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 747), and `TupletNumber` (page 749).

2.1.6 Devnull

Silently discard all musical information given to this context.

This context also accepts commands for the following context(s): `Staff` (page 314), and `Voice` (page 444).

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. Can contain `DrumVoice`.

This context also accepts commands for the following context(s): `Staff` (page 314).

This context creates the following layout object(s): `BarLine` (page 547), `BassFigure` (page 553), `BassFigureAlignment` (page 553), `BassFigureAlignmentPositioning` (page 554), `BassFigureBracket` (page 555), `BassFigureContinuation` (page 556), `BassFigureLine` (page 556), `BreathingSign` (page 565), `CaesuraScript` (page 568), `Clef` (page 577), `ClefModifier` (page 580), `CueClef` (page 589), `CueEndClef` (page 592), `DotColumn` (page 600), `FingeringColumn` (page 617), `InstrumentName` (page 630), `LedgerLineSpanner` (page 643), `NoteCollision` (page 668), `OptionalMaterialBracket` (page 673), `RestCollision` (page 690), `ScriptColumn` (page 692), `ScriptRow` (page 693), `SostenutoPedalLineSpanner` (page 704), `StaffEllipsis` (page 708), `StaffHighlight` (page 711), `StaffSpacing` (page 712), `StaffSymbol` (page 713), `SustainPedalLineSpanner` (page 723), `TimeSignature` (page 739), `UnaCordaPedalLineSpanner` (page 752), and `VerticalAxisGroup` (page 754).

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 691), 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 123).

Context `DrumStaff` can contain `CueVoice` (page 102), `DrumVoice` (page 123), and `NullVoice` (page 252).

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

`Alteration_glyph_engraver` (page 456)

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.

`Apply_output_engraver` (page 457)

Apply a procedure to any grob acknowledged.

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

`Axis_group_engraver` (page 458)

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 754).

`Bar_engraver` (page 459)

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 51), `caesura-event` (page 52), `coda-mark-event` (page 52), `dal-segno-event` (page 53), `fine-event` (page 53), `section-event` (page 58), and `segno-mark-event` (page 59),

Properties (read)

caesuraType (list)
An alist

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

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

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

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

The first argument is the context.

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

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

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

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

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

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

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

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

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

forbidBreakBetweenBarLines (boolean)
If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
: Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

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 time step.

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 547).

Caesura_engraver (page 466)
: 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 52),

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 565), and `CaesuraScript` (page 568).

`Clef_engraver` (page 468)
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 577), and `ClefModifier` (page 580).

`Collision_engraver` (page 469)
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 668).

`Cue_clef_engraver` (page 471)
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 580), `CueClef` (page 589), and `CueEndClef` (page 592).

`Dot_column_engraver` (page 473)
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 600).

`Figured_bass_engraver` (page 477)
Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 51), and `rest-event` (page 58),

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 553), `BassFigureAlignment` (page 553), `BassFigureBracket` (page 555), `BassFigureContinuation` (page 556), and `BassFigureLine` (page 556).

`Figured_bass_position_engraver` (page 477)
Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 554).

`Fingering_column_engraver` (page 478)
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 617).

`Font_size_engraver` (page 478)
Put `fontSize` into `font-size` grob property.

Properties (read)

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

`Grob_pq_engraver` (page 482)
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.).

`Horizontal_script_engraver` (page 482)
Aligns `Script` horizontally

`Instrument_name_engraver` (page 483)
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 630).

Ledger_line_engraver (page 486)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

  This engraver creates the following layout object(s): LedgerLineSpanner (page 643).

Merge_mmrest_numbers_engraver (page 491)
: 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 493)
: 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 692).

Optional_material_bracket_engraver (page 495)
: Notate in-staff brackets for optional material.

  Music types accepted: optional-material-event (page 57),

  This engraver creates the following layout object(s): OptionalMaterialBracket (page 673).

Piano_pedal_align_engraver (page 498)
: 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 704), SustainPedalLineSpanner (page 723), and UnaCordaPedalLineSpanner (page 752).

Pure_from_neighbor_engraver (page 499)
: Coordinates items that get their pure heights from their neighbors.

Rest_collision_engraver (page 500)
: 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 690).

Script_row_engraver (page 501)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 693).

Separating_line_group_engraver (page 502)
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 712).

Skip_typesetting_engraver (page 502)
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 708).

Staff_collecting_engraver (page 505)
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 505)
Highlights music passages.

Music types accepted: staff-highlight-event (page 59),

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 711).

Staff_symbol_engraver (page 506)
Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): StaffSymbol (page 713).

`Time_signature_engraver` (page 510)
Create a `TimeSignature` (page 739), whenever `timeSignature` changes.

Music types accepted: `polymetric-time-signature-event` (page 58), and `reference-time-signature-event` (page 58),

Properties (read)

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

`partialBusy` (boolean)
Signal that \partial acts at the current time step.

`timeSignature` (time signature)
A time-signature specification. See the `\time` command.

This engraver creates the following layout object(s): `TimeSignature` (page 739).

2.1.8 DrumVoice

A voice on a percussion staff.

This context also accepts commands for the following context(s): `Voice` (page 444).

This context creates the following layout object(s): `Beam` (page 557), `BendAfter` (page 560), `BreathingSign` (page 565), `CombineTextScript` (page 585), `Dots` (page 600), `DoublePercentRepeat` (page 602), `DoublePercentRepeatCounter` (page 603), `DoubleRepeatSlash` (page 604), `DynamicLineSpanner` (page 607), `DynamicText` (page 609), `DynamicTextSpanner` (page 611), `FingerGlideSpanner` (page 613), `Flag` (page 617), `Hairpin` (page 626), `InstrumentSwitch` (page 631), `LaissezVibrerTie` (page 641), `LaissezVibrerTieColumn` (page 642), `MultiMeasureRest` (page 660), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestScript` (page 664), `MultiMeasureRestText` (page 665), `NoteColumn` (page 669), `NoteHead` (page 670), `NoteSpacing` (page 672), `PercentRepeat` (page 679), `PercentRepeatCounter` (page 680), `PhrasingSlur` (page 682), `RepeatSlash` (page 687), `RepeatTie` (page 688), `RepeatTieColumn` (page 689), `Rest` (page 689), `Script` (page 691), `ScriptColumn` (page 692), `Slur` (page 700), `Stem` (page 715), `StemStub` (page 717), `StemTremolo` (page 717), `TextScript` (page 733), `TextSpanner` (page 735), `Tie` (page 737), `TieColumn` (page 739), `TrillPitchAccidental` (page 742), `TrillPitchGroup` (page 743), `TrillPitchHead` (page 744), `TrillPitchParentheses` (page 745), `TrillSpanner` (page 746), `TupletBracket` (page 747), and `TupletNumber` (page 749).

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):

`Apply_output_engraver` (page 457)
Apply a procedure to any grob acknowledged.

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

`Auto_beam_engraver` (page 457)
Generate beams based on measure characteristics and observed Stems. Uses `beatBase`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through `Stem_engraver` (page 506), properties `stemLeftBeamCount` and `stemRightBeamCount`.

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

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.

`beamExceptions` (list)
An alist of exceptions to auto-beam 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.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Beam_engraver` (page 463)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

Properties (read)

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Bend_engraver` (page 465)
Create fall spanners.

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

Properties (read)

`currentBarLine` (graphical (layout) object)
Set to the `BarLine` that `Bar_engraver` has created in the current time step.

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 560).

Breathing_sign_engraver (page 466)
Notate breath marks.

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

Properties (read)

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

This engraver creates the following layout object(s): BreathingSign (page 565).

Chord_tremolo_engraver (page 468)
Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 61),

This engraver creates the following layout object(s): Beam (page 557).

Dots_engraver (page 473)
Create Dots (page 600), objects for rhythmic-head-interface (page 827)s.

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

Double_percent_repeat_engraver (page 473)
Make double measure repeats.

Music types accepted: double-percent-event (page 53),

Properties (read)

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

measureLength (positive exact rational or +inf.0)
The musical length of the current measure.

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 602), and DoublePercentRepeatCounter (page 603).

Drum_notes_engraver (page 474)
Generate drum note heads.

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

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 670), and `Script` (page 691).

`Dynamic_align_engraver` (page 475)
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 607).

`Dynamic_engraver` (page 475)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 50), `break-dynamic-span-event` (page 52), and `span-dynamic-event` (page 59),

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 609), `DynamicTextSpanner` (page 611), and `Hairpin` (page 626).

`Finger_glide_engraver` (page 477)
Engraver to print a line between two `Fingering`, `StringNumber` or `StrokeFinger` grobs.

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

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

`Font_size_engraver` (page 478)
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 478)
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 480)
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 52),

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 557).

`Grace_beam_engraver` (page 480)
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 51),

Properties (read)

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

Grace_engraver (page 481)
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 482)
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 483)
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 631).

Laissez_vibrer_engraver (page 486)
Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 54),

This engraver creates the following layout object(s): LaissezVibrerTie (page 641), and LaissezVibrerTieColumn (page 642).

Multi_measure_rest_engraver (page 492)
Engrave multi-measure rests that are produced with 'R'. It reads measureStartNow and internalBarNumber to determine what number to print over the MultiMeasureRest (page 660).

Music types accepted: multi-measure-articulation-event (page 55), multi-measure-rest-event (page 55), and multi-measure-text-event (page 55),

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 multi-measure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), and MultiMeasureRestText (page 665).

Note_spacing_engraver (page 495)
: Generate NoteSpacing, an object linking horizontal lines for use in spacing.

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

Part_combine_engraver (page 496)
: Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted: note-event (page 56), and part-combine-event (page 57),

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 585).

Percent_repeat_engraver (page 497)
: Make whole measure repeats.

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

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 679), and PercentRepeatCounter (page 680).

`Phrasing_slur_engraver` (page 497)
Print phrasing slurs. Similar to `Slur_engraver` (page 503).

Music types accepted: `note-event` (page 56), and `phrasing-slur-event` (page 57),

This engraver creates the following layout object(s): `PhrasingSlur` (page 682).

`Pitched_trill_engraver` (page 499)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 742), `TrillPitchGroup` (page 743), `TrillPitchHead` (page 744), and `TrillPitchParentheses` (page 745).

`Repeat_tie_engraver` (page 500)
Create repeat ties.

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

This engraver creates the following layout object(s): `RepeatTie` (page 688), and `RepeatTieColumn` (page 689).

`Rest_engraver` (page 500)
Engrave rests.

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

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 689).

`Rhythmic_column_engraver` (page 501)
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 669).

`Script_column_engraver` (page 501)
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 692).

`Script_engraver` (page 501)
Handle note scripted articulations.

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

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 691).

`Slash_repeat_engraver` (page 503)
Make beat repeats.

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

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 604), and `RepeatSlash` (page 687).

`Slur_engraver` (page 503)
Build slur grobs from slur events.

Music types accepted: `note-event` (page 56), and `slur-event` (page 59),

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 700).

`Spanner_break_forbid_engraver` (page 504)
Forbid breaks in certain spanners.

`Stem_engraver` (page 506)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 61),

Properties (read)

`currentBarLine` (graphical (layout) object)
Set to the `BarLine` that `Bar_engraver` has created in the current time step.

`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 617), `Stem` (page 715), `StemStub` (page 717), and `StemTremolo` (page 717).

`Text_engraver` (page 509)
Create text scripts.

Music types accepted: `text-script-event` (page 61),

This engraver creates the following layout object(s): `TextScript` (page 733).

`Text_spanner_engraver` (page 509)
Create text spanner from an event.

Music types accepted: `text-span-event` (page 61),

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 735).

`Tie_engraver` (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 61),

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 737), and `TieColumn` (page 739).

`Toe_heel_engraver` (page 512)
Read the `toeHeelStyle` context property and use it to style `\rtoe` and its siblings, based on the data in the `toe-heel-styles` alist.

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

Properties (read)

`toeHeelStyle` (symbol)
The style for the glyph shape and behavior of `\rtoe` and siblings. Possible values are `default`, `standard`, `reversed`, `circleheels`, and `below`. If not set (the default), use value `default`.

`Trill_spanner_engraver` (page 512)
Create trill spanners.

Music types accepted: `trill-span-event` (page 61),

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 746).

`Tuplet_engraver` (page 512)
Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 62),

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 747), and `TupletNumber` (page 749).

2.1.9 Dynamics

Holds a single line of dynamics centered between the staves surrounding this context.

This context also accepts commands for the following context(s): Staff (page 314), and Voice (page 444).

This context creates the following layout object(s): BarLine (page 547), DynamicLineSpanner (page 607), DynamicText (page 609), DynamicTextSpanner (page 611), Hairpin (page 626), PianoPedalBracket (page 684), Script (page 691), SostenutoPedal (page 702), SustainPedal (page 722), TextScript (page 733), TextSpanner (page 735), UnaCordaPedal (page 750), and VerticalAxisGroup (page 754).

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 733), to `'italic`.
- Set grob property nonstaff-relatedstaff-spacing in VerticalAxisGroup (page 754), to :
  `'((basic-distance . 5) (padding . 0.5))`
- Set grob property outside-staff-priority in DynamicLineSpanner (page 607), to `#f`.
- Set grob property outside-staff-priority in DynamicText (page 609), to `#f`.
- Set grob property outside-staff-priority in Hairpin (page 626), to `#f`.
- Set grob property staff-affinity in VerticalAxisGroup (page 754), to `0`.
- Set grob property Y-offset in DynamicLineSpanner (page 607), 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):

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Axis_group_engraver (page 458)
: 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 754).

Bar_engraver (page 459)

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 51), caesura-event (page 52), coda-mark-event (page 52), dal-segno-event (page 53), fine-event (page 53), section-event (page 58), and segno-mark-event (page 59),

Properties (read)

caesuraType (list)

An alist

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

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

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

caesuraTypeTransform (procedure)

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

The first argument is the context.

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

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

doubleRepeatBarType (string)

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

doubleRepeatSegnoBarType (string)

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

endRepeatBarType (string)

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

endRepeatSegnoBarType (string)

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

fineBarType (string)

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

submeasureBarType (string)
: Bar line to insert at submeasure boundaries specified by submeasureStructure, when submeasureBarsEnabled allows.

submeasureStructure (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of beatBase.

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 time step.

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 547).

Dynamic_align_engraver (page 475)
: 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 607).

Dynamic_engraver (page 475)
: Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: absolute-dynamic-event (page 50), break-dynamic-span-event (page 52), and span-dynamic-event (page 59),

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 609), DynamicTextSpanner (page 611), and Hairpin (page 626).

Font_size_engraver (page 478)
: Put fontSize into font-size grob property.

Properties (read)

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

Piano_pedal_engraver (page 498)
: Engrave piano pedal symbols and brackets.

Music types accepted: sostenuto-event (page 59), sustain-event (page 61), and una-corda-event (page 62),

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 684), SostenutoPedal (page 702), SustainPedal (page 722), and UnaCordaPedal (page 750).

Script_engraver (page 501)
: Handle note scripted articulations.

Music types accepted: articulation-event (page 51),

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 691).

Text_engraver (page 509)
Create text scripts.

Music types accepted: text-script-event (page 61),

This engraver creates the following layout object(s): TextScript (page 733).

Text_spanner_engraver (page 509)
Create text spanner from an event.

Music types accepted: text-span-event (page 61),

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 735).

Toe_heel_engraver (page 512)
Read the toeHeelStyle context property and use it to style \rtoe and its siblings, based on the data in the toe-heel-styles alist.

Music types accepted: articulation-event (page 51),

Properties (read)

toeHeelStyle (symbol)
The style for the glyph shape and behavior of \rtoe and siblings. Possible values are default, standard, reversed, circleheels, and below. If not set (the default), use value default.

2.1.10 FiguredBass

The context in which BassFigure grobs are created from input entered in \figuremode mode.

This context creates the following layout object(s): BassFigure (page 553), BassFigureAlignment (page 553), BassFigureBracket (page 555), BassFigureContinuation (page 556), BassFigureLine (page 556), StaffSpacing (page 712), and VerticalAxisGroup (page 754).

This context sets the following properties:

- Set grob property nonstaff-nonstaff-spacing.padding in VerticalAxisGroup (page 754), to 0.5.
- Set grob property nonstaff-relatedstaff-spacing.padding in VerticalAxisGroup (page 754), to 0.5.
- Set grob property remove-empty in VerticalAxisGroup (page 754), to #t.
- Set grob property remove-first in VerticalAxisGroup (page 754), to #t.
- Set grob property staff-affinity in VerticalAxisGroup (page 754), 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 458)
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 754).

Figured_bass_engraver (page 477)
Make figured bass numbers.

Music types accepted: bass-figure-event (page 51), and rest-event (page 58),

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 553), BassFigureAlignment (page 553), BassFigureBracket (page 555), BassFigureContinuation (page 556), and BassFigureLine (page 556).

Separating_line_group_engraver (page 502)
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 712).

2.1.11 FretBoards

A context for displaying fret diagrams.

This context also accepts commands for the following context(s): Staff (page 314).

This context creates the following layout object(s): FretBoard (page 620), InstrumentName (page 630), StaffSpacing (page 712), and VerticalAxisGroup (page 754).

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):

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Axis_group_engraver (page 458)
: 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 754).

Font_size_engraver (page 478)
: Put fontSize into font-size grob property.

  Properties (read)

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

Fretboard_engraver (page 479)
: Generate fret diagram from one or more events of type NoteEvent.

  Music types accepted: fingering-event (page 54), note-event (page 56), and string-number-event (page 60),

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 620).

`Instrument_name_engraver` (page 483)
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 630).

Separating_line_group_engraver (page 502)
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 712).

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 289).

Context Global can contain ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.1.13 GrandStaff

Connect staves vertically by adding a brace on the left side. The bar lines of the contained staves are connected vertically, too.

This context creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), ChordSlur (page 574), InstrumentName (page 630), SpanBar (page 706), SpanBarStub (page 707), StaffGrouper (page 710), SystemStartBar (page 725), SystemStartBrace (page 726), SystemStartBracket (page 727), SystemStartSquare (page 728), and VerticalAlignment (page 753).

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 609), to #f.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Staff (page 314).

Context GrandStaff can contain ChoirStaff (page 69), ChordNames (page 100), Devnull (page 113), DrumStaff (page 113), Dynamics (page 133), FiguredBass (page 138), FretBoards (page 140), GrandStaff (page 142), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), NoteNames (page 250), OneStaff (page 254), PetrucciStaff (page 255), PianoStaff (page 281), RhythmicStaff (page 283), Staff

(page 314), StaffGroup (page 327), TabStaff (page 370), VaticanaLyrics (page 393), and VaticanaStaff (page 419).

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

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Instrument_name_engraver (page 483)
: 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 630).

Span_arpeggio_engraver (page 504)
: Make arpeggios, non-arpeggiato brackets, and vertical slurs spanning multiple staves.

  Properties (read)

  connectArpeggios (boolean)
  : If set, connect arpeggios across piano staff.

  connectChordBrackets (boolean)
  : If set, connect chord brackets across piano staff.

  connectChordSlurs (boolean)
  : If set, connect chord slurs across piano staff.

  This engraver creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), and ChordSlur (page 574).

Span_bar_engraver (page 504)
: 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 706).

Span_bar_stub_engraver (page 504)
: Make stubs for span bars in all contexts that the span bars cross.

  This engraver creates the following layout object(s): SpanBarStub (page 707).

System_start_delimiter_engraver (page 507)
: 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 725), SystemStartBrace (page 726), SystemStartBracket (page 727), and SystemStartSquare (page 728).

Vertical_align_engraver (page 513)
: 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 710), and VerticalAlignment (page 753).

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 223).

This context creates the following layout object(s): InstrumentName (page 630), LyricExtender (page 647), LyricHyphen (page 648), LyricRepeatCount (page 649), LyricSpace (page 651), LyricText (page 651), StanzaNumber (page 714), VerticalAxisGroup (page 754), and VowelTransition (page 760).

This context sets the following properties:

- Set context property instrumentName to '().
- Set context property lyricRepeatCountFormatter to #<program>.
- Set context property searchForVoice to #f.
- Set context property shortInstrumentName to '().
- Set grob property bar-extent in BarLine (page 547), to :

  ```
  '(-0.05 . 0.05)
  ```

- Set grob property font-size in InstrumentName (page 630), to 1.0.
- Set grob property nonstaff-nonstaff-spacing in VerticalAxisGroup (page 754), to :

  ```
  '((basic-distance . 0)
   (minimum-distance . 2.8)
   (padding . 0.2)
   (stretchability . 0))
  ```

- Set grob property nonstaff-relatedstaff-spacing in VerticalAxisGroup (page 754), to :

  '((basic-distance . 5.5) (padding . 0.5) (stretchability . 1))
- Set grob property nonstaff-unrelatedstaff-spacing.padding in VerticalAxisGroup (page 754), to 1.5.
- Set grob property parent-alignment-X in LyricRepeatCount (page 649), to 1.
- Set grob property remove-empty in VerticalAxisGroup (page 754), to #t.
- Set grob property remove-first in VerticalAxisGroup (page 754), to #t.
- Set grob property self-alignment-Y in InstrumentName (page 630), to #f.
- Set grob property short-bar-extent in BarLine (page 547), to :

  '(-0.05 . 0.05)
- Set grob property staff-affinity in VerticalAxisGroup (page 754), 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 458)

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 754).

Extender_engraver (page 476)

Create lyric extenders.

Music types accepted: completize-extender-event (page 53), extender-event (page 53), hyphen-event (page 54), and lyric-event (page 55),

Properties (read)

autoExtenders (boolean)
: Create lyric extenders automatically for syllables in melismata that are not followed by a hyphen.

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

This engraver creates the following layout object(s): LyricExtender (page 647).

`Font_size_engraver` (page 478)
Put `fontSize` into `font-size` grob property.

Properties (read)

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

`Hyphen_engraver` (page 483)
Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted: `hyphen-event` (page 54), and `vowel-transition-event` (page 62),

This engraver creates the following layout object(s): `LyricHyphen` (page 648), `LyricSpace` (page 651), and `VowelTransition` (page 760).

`Instrument_name_engraver` (page 483)
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 630).

`Lyric_engraver` (page 487)
Engrave text for lyrics.

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

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 651).

`Lyric_repeat_count_engraver` (page 487)
Create repeat counts within lyrics for modern transcriptions of Gregorian chant.

Music types accepted: `volta-repeat-end-event` (page 62),

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 649).

`Pure_from_neighbor_engraver` (page 499)
Coordinates items that get their pure heights from their neighbors.

`Stanza_number_engraver` (page 506)
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 714).

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 314).

This context creates the following layout object(s): `Accidental` (page 533), `AccidentalCautionary` (page 534), `AccidentalPlacement` (page 535), `AccidentalSuggestion` (page 536), `BarLine` (page 547), `BassFigure` (page 553), `BassFigureAlignment` (page 553), `BassFigureAlignmentPositioning` (page 554), `BassFigureBracket` (page 555), `BassFigureContinuation` (page 556), `BassFigureLine` (page 556), `Clef` (page 577), `ClefModifier` (page 580), `CueClef` (page 589), `CueEndClef` (page 592), `Divisio` (page 597), `DotColumn` (page 600), `FingeringColumn` (page 617), `InstrumentName` (page 630), `KeyCancellation` (page 634), `KeySignature` (page 637), `LedgerLineSpanner` (page 643), `NoteCollision` (page 668), `OptionalMaterialBracket` (page 673), `OttavaBracket` (page 676), `PianoPedalBracket` (page 684), `RestCollision` (page 690), `ScriptColumn` (page 692), `ScriptRow` (page 693), `SostenutoPedal` (page 702), `SostenutoPedalLineSpanner` (page 704), `StaffEllipsis` (page 708), `StaffHighlight` (page 711), `StaffSpacing` (page 712), `StaffSymbol` (page 713), `SustainPedal` (page 722), `SustainPedalLineSpanner` (page 723), `UnaCordaPedal` (page 750), `UnaCordaPedalLineSpanner` (page 752), and `VerticalAxisGroup` (page 754).

This context sets the following properties:

- Set context property `autoAccidentals` to:
  `'(Staff #<program>)`
- 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 submeasureBarType to '().
- Set context property underlyingRepeatBarType to "||".
- Set grob property extra-spacing-height in BreathingSign (page 565), to item::extra-spacing-height-including-staff.
- Set grob property extra-spacing-width in BreathingSign (page 565), 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 160).

Context GregorianTranscriptionStaff can contain CueVoice (page 102), GregorianTranscriptionVoice (page 160), and NullVoice (page 252).

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

Accidental_engraver (page 455)
: 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 533), AccidentalCautionary (page 534), AccidentalPlacement (page 535), and AccidentalSuggestion (page 536).

Alteration_glyph_engraver (page 456)
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.

Apply_output_engraver (page 457)
Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 51),

Axis_group_engraver (page 458)
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 754).

Bar_engraver (page 459)
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 51), caesura-event (page 52), coda-mark-event (page 52), dal-segno-event (page 53), fine-event (page 53), section-event (page 58), and segno-mark-event (page 59),

Properties (read)

caesuraType (list)
An alist

((bar-line . *bar-type*)

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

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

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

`caesuraTypeTransform` (procedure)
: An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

  The first argument is the context.

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

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

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

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

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

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

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
: Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`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 time step.

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 547).

Clef_engraver (page 468)
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 577), and ClefModifier (page 580).

Collision_engraver (page 469)
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 668).

`Cue_clef_engraver` (page 471)

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 580), `CueClef` (page 589), and `CueEndClef` (page 592).

`Divisio_engraver` (page 472)

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

Music types accepted: `caesura-event` (page 52), `fine-event` (page 53), `section-event` (page 58), `volta-repeat-end-event` (page 62), and `volta-repeat-start-event` (page 62),

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 597).

Dot_column_engraver (page 473)
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 600).

Figured_bass_engraver (page 477)
Make figured bass numbers.

Music types accepted: bass-figure-event (page 51), and rest-event (page 58),

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 553), BassFigureAlignment (page 553), BassFigureBracket (page 555), BassFigureContinuation (page 556), and BassFigureLine (page 556).

Figured_bass_position_engraver (page 477)
Position figured bass alignments over notes.

This engraver creates the following layout object(s): BassFigureAlignmentPositioning (page 554).

Fingering_column_engraver (page 478)
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 617).

Font_size_engraver (page 478)
Put fontSize into font-size grob property.

Properties (read)

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

Grob_pq_engraver (page 482)
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.).

Horizontal_script_engraver (page 482)
Aligns Script horizontally

Instrument_name_engraver (page 483)
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 630).

Key_engraver (page 485)
Engrave a key signature.

Music types accepted: key-change-event (page 54),

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 634), and KeySignature (page 637).

Ledger_line_engraver (page 486)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): LedgerLineSpanner (page 643).

`Merge_mmrest_numbers_engraver` (page 491)
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 493)
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 692).

`Optional_material_bracket_engraver` (page 495)
Notate in-staff brackets for optional material.

Music types accepted: `optional-material-event` (page 57),

This engraver creates the following layout object(s): `OptionalMaterialBracket` (page 673).

`Ottava_spanner_engraver` (page 495)
Create a text spanner when the ottavation property changes.

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

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 676).

`Piano_pedal_align_engraver` (page 498)
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 704), `SustainPedalLineSpanner` (page 723), and `UnaCordaPedalLineSpanner` (page 752).

`Piano_pedal_engraver` (page 498)
Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 59), `sustain-event` (page 61), and `una-corda-event` (page 62),

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 684), SostenutoPedal (page 702), SustainPedal (page 722), and UnaCordaPedal (page 750).

Pure_from_neighbor_engraver (page 499)
Coordinates items that get their pure heights from their neighbors.

Rest_collision_engraver (page 500)
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 690).

Script_row_engraver (page 501)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 693).

Separating_line_group_engraver (page 502)
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 712).

Skip_typesetting_engraver (page 502)
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 708).

Staff_collecting_engraver (page 505)
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 505)
Highlights music passages.

Music types accepted: staff-highlight-event (page 59),

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 711).

Staff_symbol_engraver (page 506)
Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): StaffSymbol (page 713).

2.1.16 GregorianTranscriptionVoice

A voice for notating Gregorian chant in modern style.

This context also accepts commands for the following context(s): Voice (page 444).

This context creates the following layout object(s): ApproximatePitchNoteHead (page 542), Arpeggio (page 544), Beam (page 557), BendAfter (page 560), BreathingSign (page 565), ChordBracket (page 572), ChordSlur (page 574), ClusterSpanner (page 582), ClusterSpannerBeacon (page 582), CombineTextScript (page 585), Dots (page 600), DoublePercentRepeat (page 602), DoublePercentRepeatCounter (page 603), DoubleRepeatSlash (page 604), DynamicLineSpanner (page 607), DynamicText (page 609), DynamicTextSpanner (page 611), Episema (page 612), FingerGlideSpanner (page 613), Fingering (page 615), Glissando (page 622), Hairpin (page 626), InstrumentSwitch (page 631), LaissezVibrerTie (page 641), LaissezVibrerTieColumn (page 642), MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), MultiMeasureRestText (page 665), NoteColumn (page 669), NoteHead (page 670), NoteSpacing (page 672), PercentRepeat (page 679), PercentRepeatCounter (page 680), PhrasingSlur (page 682), RepeatSlash (page 687), RepeatTie (page 688), RepeatTieColumn (page 689), Rest (page 689), Script (page 691), ScriptColumn (page 692), Slur (page 700), StringNumber (page 718), StrokeFinger (page 720), TextScript (page 733), TextSpanner (page 735), Tie (page 737), TieColumn (page 739), TrillPitchAccidental (page 742), TrillPitchGroup (page 743),

TrillPitchHead (page 744), TrillPitchParentheses (page 745), TrillSpanner (page 746), TupletBracket (page 747), TupletNumber (page 749), and VoiceFollower (page 756).

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):

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Arpeggio_engraver (page 457)
: Create arpeggiato and non-arpeggiato symbols.

  Music types accepted: arpeggio-event (page 51), chord-slur-event (page 52), and non-arpeggiato-event (page 56),

  This engraver creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), and ChordSlur (page 574).

Auto_beam_engraver (page 457)
: Generate beams based on measure characteristics and observed Stems. Uses beatBase, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Stem_engraver (page 506), properties stemLeftBeamCount and stemRightBeamCount.

  Music types accepted: beam-forbid-event (page 52),

  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.

  beamExceptions (list)
  : An alist of exceptions to auto-beam 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.

  beatBase (positive exact rational or +inf.0)
  : The musical length corresponding to one unit of beatStructure.

  beatStructure (number list)
  : A sequence describing the length of each beat in the measure in units of beatBase.

  subdivideBeams (boolean)
  : If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

  This engraver creates the following layout object(s): Beam (page 557).

Beam_engraver (page 463)
: Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

Properties (read)

beamMelismaBusy (boolean)
Signal if a beam is present.

beatBase (positive exact rational or +inf.0)
The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Bend_engraver (page 465)
Create fall spanners.

Music types accepted: bend-after-event (page 52),

Properties (read)

currentBarLine (graphical (layout) object)
Set to the BarLine that Bar_engraver has created in the current time step.

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 560).

Breathing_sign_engraver (page 466)
Notate breath marks.

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

Properties (read)

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

This engraver creates the following layout object(s): BreathingSign (page 565).

Chord_tremolo_engraver (page 468)
Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 61),

This engraver creates the following layout object(s): Beam (page 557).

Cluster_spanner_engraver (page 469)
Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 52),

This engraver creates the following layout object(s): ClusterSpanner (page 582), and ClusterSpannerBeacon (page 582).

`Dots_engraver` (page 473)
Create `Dots` (page 600), objects for `rhythmic-head-interface` (page 827)s.

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

`Double_percent_repeat_engraver` (page 473)
Make double measure repeats.

Music types accepted: `double-percent-event` (page 53),

Properties (read)

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

`measureLength` (positive exact rational or +inf.0)
The musical length of the current measure.

`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 602), and `DoublePercentRepeatCounter` (page 603).

`Dynamic_align_engraver` (page 475)
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 607).

`Dynamic_engraver` (page 475)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 50), `break-dynamic-span-event` (page 52), and `span-dynamic-event` (page 59),

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 609), `DynamicTextSpanner` (page 611), and `Hairpin` (page 626).

`Episema_engraver` (page 476)
Create an *Editio Vaticana*-style episema line.

Music types accepted: `episema-event` (page 53),

This engraver creates the following layout object(s): `Episema` (page 612).

`Finger_glide_engraver` (page 477)
Engraver to print a line between two `Fingering`, `StringNumber` or `StrokeFinger` grobs.

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

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

`Fingering_engraver` (page 478)
Create fingering scripts.

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

This engraver creates the following layout object(s): `Fingering` (page 615).

`Font_size_engraver` (page 478)
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 478)
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 480)
Engrave glissandi.

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

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 '() defaults to '((0 . 0) (1 . 1) ... (*n* . *n*)), where *n* is the minimum number of note heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s): Glissando (page 622).

Grace_auto_beam_engraver (page 480)
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 52),

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 557).

Grace_beam_engraver (page 480)
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 51),

Properties (read)

beamMelismaBusy (boolean)
Signal if a beam is present.

beatBase (positive exact rational or +inf.0)
The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Grace_engraver (page 481)
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 482)
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 483)
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 631).

Laissez_vibrer_engraver (page 486)
Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 54),

This engraver creates the following layout object(s): LaissezVibrerTie (page 641), and LaissezVibrerTieColumn (page 642).

Multi_measure_rest_engraver (page 492)
Engrave multi-measure rests that are produced with 'R'. It reads measureStartNow and internalBarNumber to determine what number to print over the MultiMeasureRest (page 660).

Music types accepted: multi-measure-articulation-event (page 55), multi-measure-rest-event (page 55), and multi-measure-text-event (page 55),

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 multi-measure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), and MultiMeasureRestText (page 665).

New_fingering_engraver (page 493)
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 615), Script (page 691), StringNumber (page 718), and StrokeFinger (page 720).

Note_head_line_engraver (page 493)
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 756).

Note_heads_engraver (page 494)
Generate note heads.

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

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): ApproximatePitchNoteHead (page 542), and NoteHead (page 670).

Note_spacing_engraver (page 495)
Generate NoteSpacing, an object linking horizontal lines for use in spacing.

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

Part_combine_engraver (page 496)
Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted: note-event (page 56), and part-combine-event (page 57),

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 585).

Percent_repeat_engraver (page 497)
Make whole measure repeats.

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

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 679), and PercentRepeatCounter (page 680).

Phrasing_slur_engraver (page 497)
Print phrasing slurs. Similar to Slur_engraver (page 503).

Music types accepted: note-event (page 56), and phrasing-slur-event (page 57),

This engraver creates the following layout object(s): PhrasingSlur (page 682).

Pitched_trill_engraver (page 499)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), and TrillPitchParentheses (page 745).

Repeat_tie_engraver (page 500)
Create repeat ties.

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

This engraver creates the following layout object(s): RepeatTie (page 688), and RepeatTieColumn (page 689).

Rest_engraver (page 500)
Engrave rests.

Music types accepted: rest-event (page 58),

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 689).

Rhythmic_column_engraver (page 501)
Generate NoteColumn, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): NoteColumn (page 669).

`Script_column_engraver` (page 501)
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 692).

`Script_engraver` (page 501)
Handle note scripted articulations.

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

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 691).

`Slash_repeat_engraver` (page 503)
Make beat repeats.

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

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 604), and `RepeatSlash` (page 687).

`Slur_engraver` (page 503)
Build slur grobs from slur events.

Music types accepted: `note-event` (page 56), and `slur-event` (page 59),

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 700).

`Spanner_break_forbid_engraver` (page 504)
Forbid breaks in certain spanners.

`Text_engraver` (page 509)
Create text scripts.

Music types accepted: `text-script-event` (page 61),

This engraver creates the following layout object(s): `TextScript` (page 733).

`Text_spanner_engraver` (page 509)
Create text spanner from an event.

Music types accepted: `text-span-event` (page 61),

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 735).

`Tie_engraver` (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 61),

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 737), and `TieColumn` (page 739).

`Toe_heel_engraver` (page 512)
Read the `toeHeelStyle` context property and use it to style `\rtoe` and its siblings, based on the data in the `toe-heel-styles` alist.

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

Properties (read)

`toeHeelStyle` (symbol)
The style for the glyph shape and behavior of `\rtoe` and siblings. Possible values are `default`, `standard`, `reversed`, `circleheels`, and `below`. If not set (the default), use value `default`.

`Trill_spanner_engraver` (page 512)
Create trill spanners.

Music types accepted: `trill-span-event` (page 61),

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 746).

`Tuplet_engraver` (page 512)
Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 62),

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 747), and `TupletNumber` (page 749).

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 533), AccidentalCautionary (page 534), AccidentalPlacement (page 535), AccidentalSuggestion (page 536), BarLine (page 547), BassFigure (page 553), BassFigureAlignment (page 553), BassFigureAlignmentPositioning (page 554), BassFigureBracket (page 555), BassFigureContinuation (page 556), BassFigureLine (page 556), Clef (page 577), ClefModifier (page 580), CueClef (page 589), CueEndClef (page 592), Divisio (page 597), DotColumn (page 600), FingeringColumn (page 617), InstrumentName (page 630), KeyCancellation (page 634), KeySignature (page 637), LedgerLineSpanner (page 643), NoteCollision (page 668), OptionalMaterialBracket (page 673), OttavaBracket (page 676), PianoPedalBracket (page 684), RestCollision (page 690), ScriptColumn (page 692), ScriptRow (page 693), SostenutoPedal (page 702), SostenutoPedalLineSpanner (page 704), StaffEllipsis (page 708), StaffHighlight (page 711), StaffSpacing (page 712), StaffSymbol (page 713), SustainPedal (page 722), SustainPedalLineSpanner (page 723), TimeSignature (page 739), UnaCordaPedal (page 750), UnaCordaPedalLineSpanner (page 752), and VerticalAxisGroup (page 754).

This context sets the following properties:

- Set context property autoAccidentals to:
  ```
  '(Staff #<program>)
  ```
- 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 submeasureBarType to '().
- Set context property underlyingRepeatBarType to "||".
- Set grob property extra-spacing-height in BreathingSign (page 565), to item::extra-spacing-height-including-staff.
- Set grob property extra-spacing-width in BreathingSign (page 565), to : '(-1.0 . 0.0)

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

Context InternalGregorianStaff can contain CueVoice (page 102), and NullVoice (page 252).

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

Accidental_engraver (page 455)

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 533), `AccidentalCautionary` (page 534), `AccidentalPlacement` (page 535), and `AccidentalSuggestion` (page 536).

`Alteration_glyph_engraver` (page 456)
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.

`Apply_output_engraver` (page 457)
Apply a procedure to any grob acknowledged.

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

`Axis_group_engraver` (page 458)
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 754).

`Bar_engraver` (page 459)
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 51), `caesura-event` (page 52), `coda-mark-event` (page 52), `dal-segno-event` (page 53), `fine-event` (page 53), `section-event` (page 58), and `segno-mark-event` (page 59),

Properties (read)

`caesuraType` (list)
An alist

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

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

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

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

The first argument is the context.

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

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

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

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

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

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

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`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 time step.

`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 547).

`Clef_engraver` (page 468)
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 577), and `ClefModifier` (page 580).

`Collision_engraver` (page 469)
: 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 668).

`Cue_clef_engraver` (page 471)
: 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 580), `CueClef` (page 589), and `CueEndClef` (page 592).

`Divisio_engraver` (page 472)
: Create divisiones: chant notation for points of breathing or caesura.

Music types accepted: `caesura-event` (page 52), `fine-event` (page 53), `section-event` (page 58), `volta-repeat-end-event` (page 62), and `volta-repeat-start-event` (page 62),

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 597).

`Dot_column_engraver` (page 473)
: 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 600).

`Figured_bass_engraver` (page 477)
Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 51), and `rest-event` (page 58),

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 553), `BassFigureAlignment` (page 553), `BassFigureBracket` (page 555), `BassFigureContinuation` (page 556), and `BassFigureLine` (page 556).

`Figured_bass_position_engraver` (page 477)
Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 554).

`Fingering_column_engraver` (page 478)
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 617).

`Font_size_engraver` (page 478)
Put `fontSize` into `font-size` grob property.

Properties (read)

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

`Grob_pq_engraver` (page 482)
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.).

`Horizontal_script_engraver` (page 482)
Aligns `Script` horizontally

`Instrument_name_engraver` (page 483)
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 630).

`Key_engraver` (page 485)
Engrave a key signature.

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

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 634), and `KeySignature` (page 637).

`Ledger_line_engraver` (page 486)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 643).

`Merge_mmrest_numbers_engraver` (page 491)
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 493)
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 692).

`Optional_material_bracket_engraver` (page 495)
Notate in-staff brackets for optional material.

Music types accepted: `optional-material-event` (page 57),

This engraver creates the following layout object(s): `OptionalMaterialBracket` (page 673).

`Ottava_spanner_engraver` (page 495)
Create a text spanner when the ottavation property changes.

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

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 676).

Piano_pedal_align_engraver (page 498)
: 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 704), SustainPedalLineSpanner (page 723), and UnaCordaPedalLineSpanner (page 752).

Piano_pedal_engraver (page 498)
: Engrave piano pedal symbols and brackets.

Music types accepted: sostenuto-event (page 59), sustain-event (page 61), and una-corda-event (page 62),

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 684), SostenutoPedal (page 702), SustainPedal (page 722), and UnaCordaPedal (page 750).

Pure_from_neighbor_engraver (page 499)
: Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 500)
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 690).

`Script_row_engraver` (page 501)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 693).

`Separating_line_group_engraver` (page 502)
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 712).

`Skip_typesetting_engraver` (page 502)
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 708).

`Staff_collecting_engraver` (page 505)
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 505)
Highlights music passages.

Music types accepted: `staff-highlight-event` (page 59),

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 711).

`Staff_symbol_engraver` (page 506)
Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): `StaffSymbol` (page 713).

`Time_signature_engraver` (page 510)
Create a `TimeSignature` (page 739), whenever `timeSignature` changes.

Music types accepted: `polymetric-time-signature-event` (page 58), and `reference-time-signature-event` (page 58),

Properties (read)

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

`partialBusy` (boolean)
Signal that \partial acts at the current time step.

`timeSignature` (time signature)
A time-signature specification. See the `\time` command.

This engraver creates the following layout object(s): `TimeSignature` (page 739).

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 533), `AccidentalCautionary` (page 534), `AccidentalPlacement` (page 535), `AccidentalSuggestion` (page 536), `BarLine` (page 547), `BassFigure` (page 553), `BassFigureAlignment` (page 553), `BassFigureAlignmentPositioning` (page 554), `BassFigureBracket` (page 555), `BassFigureContinuation` (page 556), `BassFigureLine` (page 556), `BreathingSign` (page 565), `CaesuraScript` (page 568), `Clef` (page 577), `ClefModifier` (page 580), `CueClef` (page 589), `CueEndClef` (page 592), `Custos` (page 595), `DotColumn` (page 600), `FingeringColumn` (page 617), `InstrumentName` (page 630), `KeyCancellation` (page 634), `KeySignature` (page 637), `LedgerLineSpanner` (page 643), `NoteCollision` (page 668), `OptionalMaterialBracket` (page 673), `OttavaBracket` (page 676), `PianoPedalBracket` (page 684), `RestCollision` (page 690), `ScriptColumn` (page 692), `ScriptRow` (page 693), `SignumRepetitionis` (page 697), `SostenutoPedal` (page 702), `SostenutoPedalLineSpanner` (page 704), `StaffEllipsis` (page 708), `StaffHighlight` (page 711), `StaffSpacing` (page 712), `StaffSymbol` (page 713), `SustainPedal` (page 722), `SustainPedalLineSpanner` (page 723), `TimeSignature` (page 739), `UnaCordaPedal` (page 750), `UnaCordaPedalLineSpanner` (page 752), and `VerticalAxisGroup` (page 754).

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 #<program>)
```

- Set context property `autoCautionaries` to `'()`.
- Set context property `caesuraType` to:

```
'((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 595), to -1.
- Set grob property neutral-position in Custos (page 595), to 3.
- Set grob property style in Custos (page 595), to 'mensural.
- Set grob property style in TimeSignature (page 739), to 'mensural.

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

Context InternalMensuralStaff can contain CueVoice (page 102), and NullVoice (page 252).

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

Accidental_engraver (page 455)
: 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 533), AccidentalCautionary (page 534), AccidentalPlacement (page 535), and AccidentalSuggestion (page 536).

Alteration_glyph_engraver (page 456)
: 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.

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 51),

Axis_group_engraver (page 458)
: 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 754).

Bar_engraver (page 459)
: 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 51), caesura-event (page 52), coda-mark-event (page 52), dal-segno-event (page 53), fine-event (page 53), section-event (page 58), and segno-mark-event (page 59),

Properties (read)

caesuraType (list)
: An alist

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

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

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

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

`caesuraTypeTransform` (procedure)
: An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

  The first argument is the context.

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

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

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

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

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

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

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
: Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`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 time step.

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 547).

Caesura_engraver (page 466)
: 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 52),

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 565), and `CaesuraScript` (page 568).

`Clef_engraver` (page 468)
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 577), and `ClefModifier` (page 580).

`Collision_engraver` (page 469)
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 668).

`Cue_clef_engraver` (page 471)
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 580), `CueClef` (page 589), and `CueEndClef` (page 592).

`Custos_engraver` (page 472)
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.

`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): `Custos` (page 595).

`Dot_column_engraver` (page 473)
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 600).

`Figured_bass_engraver` (page 477)
Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 51), and `rest-event` (page 58),

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 553), `BassFigureAlignment` (page 553), `BassFigureBracket` (page 555), `BassFigureContinuation` (page 556), and `BassFigureLine` (page 556).

`Figured_bass_position_engraver` (page 477)
: Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 554).

`Fingering_column_engraver` (page 478)
: 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 617).

`Font_size_engraver` (page 478)
: Put `fontSize` into `font-size` grob property.

Properties (read)

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

`Grob_pq_engraver` (page 482)
: 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.).

`Horizontal_script_engraver` (page 482)
: Aligns `Script` horizontally

`Instrument_name_engraver` (page 483)
: 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 630).

`Key_engraver` (page 485)
: Engrave a key signature.

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

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 634), and KeySignature (page 637).

Ledger_line_engraver (page 486)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): LedgerLineSpanner (page 643).

Merge_mmrest_numbers_engraver (page 491)
: 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 493)
: 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 692).

Optional_material_bracket_engraver (page 495)
: Notate in-staff brackets for optional material.

Music types accepted: optional-material-event (page 57),

This engraver creates the following layout object(s): OptionalMaterialBracket (page 673).

Ottava_spanner_engraver (page 495)
: Create a text spanner when the ottavation property changes.

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

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 676).

`Piano_pedal_align_engraver` (page 498)
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 704), `SustainPedalLineSpanner` (page 723), and `UnaCordaPedalLineSpanner` (page 752).

`Piano_pedal_engraver` (page 498)
Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 59), `sustain-event` (page 61), and `una-corda-event` (page 62),

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 684), `SostenutoPedal` (page 702), `SustainPedal` (page 722), and `UnaCordaPedal` (page 750).

`Pure_from_neighbor_engraver` (page 499)
Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 500)
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 690).

Script_row_engraver (page 501)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 693).

Separating_line_group_engraver (page 502)
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 712).

Signum_repetitionis_engraver (page 502)
Create a SignumRepetitionis at the end of a \repeat volta section.

Music types accepted: volta-repeat-end-event (page 62),

This engraver creates the following layout object(s): SignumRepetitionis (page 697).

Skip_typesetting_engraver (page 502)
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 708).

Staff_collecting_engraver (page 505)
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 505)
Highlights music passages.

Music types accepted: staff-highlight-event (page 59),

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 711).

Staff_symbol_engraver (page 506)
: Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): StaffSymbol (page 713).

Time_signature_engraver (page 510)
: Create a TimeSignature (page 739), whenever timeSignature changes.

Music types accepted: polymetric-time-signature-event (page 58), and reference-time-signature-event (page 58),

Properties (read)

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

partialBusy (boolean)
: Signal that \partial acts at the current time step.

timeSignature (time signature)
: A time-signature specification. See the \time command.

This engraver creates the following layout object(s): TimeSignature (page 739).

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 314).

This context creates the following layout object(s): Accidental (page 533), AccidentalCautionary (page 534), AccidentalPlacement (page 535), AccidentalSuggestion (page 536), BarLine (page 547), BassFigure (page 553), BassFigureAlignment (page 553), BassFigureAlignmentPositioning (page 554), BassFigureBracket (page 555), BassFigureContinuation (page 556), BassFigureLine (page 556), BreathingSign (page 565), CaesuraScript (page 568), Clef (page 577), ClefModifier (page 580), CueClef (page 589), CueEndClef (page 592), DotColumn (page 600), FingeringColumn (page 617), InstrumentName (page 630), KeyCancellation (page 634), KeySignature (page 637), LedgerLineSpanner (page 643), NoteCollision (page 668), OptionalMaterialBracket (page 673), OttavaBracket (page 676), PianoPedalBracket (page 684), RestCollision (page 690), ScriptColumn (page 692), ScriptRow (page 693), SostenutoPedal (page 702), SostenutoPedalLineSpanner (page 704), StaffEllipsis (page 708), StaffHighlight (page 711), StaffSpacing (page 712), StaffSymbol (page 713), SustainPedal (page 722), SustainPedalLineSpanner (page 723), UnaCordaPedal (page 750), UnaCordaPedalLineSpanner (page 752), and VerticalAxisGroup (page 754).

This context sets the following properties:

- Set context property alterationGlyphs to:

  ```
  '((-1/2 . "accidentals.kievanM1") (1/2 . "accidentals.kievan1"))
  ```

- Set context property autoAccidentals to:

  ```
  '(Staff #<program>)
  ```

- Set context property autoCautionaries to '().
- Set context property caesuraType to:
  '((bar-line . "."))
- Set context property clefGlyph to "clefs.kievan.do".
- Set context property clefPosition to 0.
- Set context property clefTransposition to 0.
- Set context property createSpacing to #t.
- Set context property doubleRepeatBarType to "k".
- Set context property endRepeatBarType to "k".
- Set context property extraNatural to #f.
- Set context property fineBarType to "k".
- Set context property forbidBreakBetweenBarLines to #f.
- Set context property ignoreFiguredBassRest to #f.
- Set context property instrumentName to '().
- Set context property localAlterations to '().
- Set context property measureBarType to '().
- Set context property middleCClefPosition to 0.
- Set context property middleCPosition to 0.
- Set context property ottavationMarkups to:
  ```
  '((4 . "29")
    (3 . "22")
    (2 . "15")
    (1 . "8")
    (-1 . "8")
    (-2 . "15")
    (-3 . "22")
    (-4 . "29"))
  ```
- Set context property printKeyCancellation to #f.
- Set context property sectionBarType to "k".
- Set context property shortInstrumentName to '().
- Set context property startRepeatBarType to "k".
- Set context property submeasureBarType to '().
- Set context property underlyingRepeatBarType to "k".
- Set grob property positions in OptionalMaterialBracket (page 673), to :
  '(-1.75 . 1.75)
- Set grob property protrusion in OptionalMaterialBracket (page 673), to 0.5.
- Set grob property thick-thickness in BarLine (page 547), to 3.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type KievanVoice (page 212).

Context KievanStaff can contain CueVoice (page 102), KievanVoice (page 212), and NullVoice (page 252).

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

Accidental_engraver (page 455)
: 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 533), AccidentalCautionary (page 534), AccidentalPlacement (page 535), and AccidentalSuggestion (page 536).

Alteration_glyph_engraver (page 456)
: 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.

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 51),

Axis_group_engraver (page 458)
: 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 754).

Bar_engraver (page 459)
: 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 51), caesura-event (page 52), coda-mark-event (page 52), dal-segno-event (page 53), fine-event (page 53), section-event (page 58), and segno-mark-event (page 59),

Properties (read)

`caesuraType` (list)
An alist

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

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

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

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

The first argument is the context.

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

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

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

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

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

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

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

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

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

`forbidBreakBetweenBarLines` (boolean)
If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
: Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

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 time step.

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 547).

Caesura_engraver (page 466)
: 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 52),

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 565), and `CaesuraScript` (page 568).

`Clef_engraver` (page 468)
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 577), and `ClefModifier` (page 580).

`Collision_engraver` (page 469)
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 668).

`Cue_clef_engraver` (page 471)
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 580), `CueClef` (page 589), and `CueEndClef` (page 592).

`Dot_column_engraver` (page 473)
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 600).

`Figured_bass_engraver` (page 477)
Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 51), and `rest-event` (page 58),

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 553), BassFigureAlignment (page 553), BassFigureBracket (page 555), BassFigureContinuation (page 556), and BassFigureLine (page 556).

Figured_bass_position_engraver (page 477)
Position figured bass alignments over notes.

This engraver creates the following layout object(s): BassFigureAlignmentPositioning (page 554).

Fingering_column_engraver (page 478)
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 617).

Font_size_engraver (page 478)
Put fontSize into font-size grob property.

Properties (read)

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

Grob_pq_engraver (page 482)
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.).

Horizontal_script_engraver (page 482)
Aligns Script horizontally

Instrument_name_engraver (page 483)
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 630).

`Key_engraver` (page 485)
: Engrave a key signature.

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

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 634), and `KeySignature` (page 637).

`Ledger_line_engraver` (page 486)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 643).

`Merge_mmrest_numbers_engraver` (page 491)
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 493)
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 692).

`Optional_material_bracket_engraver` (page 495)
Notate in-staff brackets for optional material.

Music types accepted: `optional-material-event` (page 57),

This engraver creates the following layout object(s): `OptionalMaterialBracket` (page 673).

`Ottava_spanner_engraver` (page 495)
Create a text spanner when the ottavation property changes.

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

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 676).

`Piano_pedal_align_engraver` (page 498)
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 704), `SustainPedalLineSpanner` (page 723), and `UnaCordaPedalLineSpanner` (page 752).

`Piano_pedal_engraver` (page 498)
Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 59), `sustain-event` (page 61), and `una-corda-event` (page 62),

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 684), `SostenutoPedal` (page 702), `SustainPedal` (page 722), and `UnaCordaPedal` (page 750).

`Pure_from_neighbor_engraver` (page 499)
Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 500)
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 690).

`Script_row_engraver` (page 501)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 693).

`Separating_line_group_engraver` (page 502)
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 712).

`Skip_typesetting_engraver` (page 502)
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 708).

`Staff_collecting_engraver` (page 505)
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 505)
Highlights music passages.

Music types accepted: `staff-highlight-event` (page 59),

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 711).

`Staff_symbol_engraver` (page 506)
Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): `StaffSymbol` (page 713).

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 444).

This context creates the following layout object(s): ApproximatePitchNoteHead (page 542), Arpeggio (page 544), Beam (page 557), BendAfter (page 560), BreathingSign (page 565), ChordBracket (page 572), ChordSlur (page 574), ClusterSpanner (page 582), ClusterSpannerBeacon (page 582), CombineTextScript (page 585), Dots (page 600), DoublePercentRepeat (page 602), DoublePercentRepeatCounter (page 603), DoubleRepeatSlash (page 604), DynamicLineSpanner (page 607), DynamicText (page 609), DynamicTextSpanner (page 611), FingerGlideSpanner (page 613), Fingering (page 615), Flag (page 617), Glissando (page 622), Hairpin (page 626), InstrumentSwitch (page 631), KievanLigature (page 640), LaissezVibrerTie (page 641), LaissezVibrerTieColumn (page 642), MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), MultiMeasureRestText (page 665), NoteColumn (page 669), NoteHead (page 670), NoteSpacing (page 672), PercentRepeat (page 679), PercentRepeatCounter (page 680), PhrasingSlur (page 682), RepeatSlash (page 687), RepeatTie (page 688), RepeatTieColumn (page 689), Rest (page 689), Script (page 691), ScriptColumn (page 692), Slur (page 700), Stem (page 715), StemStub (page 717), StemTremolo (page 717), StringNumber (page 718), StrokeFinger (page 720), TextScript (page 733), TextSpanner (page 735), Tie (page 737), TieColumn (page 739), TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), TrillPitchParentheses (page 745), TrillSpanner (page 746), TupletBracket (page 747), TupletNumber (page 749), and VoiceFollower (page 756).

This context sets the following properties:

- Set context property autoBeaming to #f.
- Set grob property duration-log in NoteHead (page 670), to note-head::calc-kievan-duration-log.
- Set grob property length in Stem (page 715), to 0.0.
- Set grob property positions in Beam (page 557), to beam::get-kievan-positions.
- Set grob property quantized-positions in Beam (page 557), to beam::get-kievan-quantized-positions.
- Set grob property stencil in Flag (page 617), to #f.
- Set grob property stencil in Slur (page 700), to #f.
- Set grob property stencil in Stem (page 715), to #f.
- Set grob property style in Dots (page 600), to 'kievan.
- Set grob property style in NoteHead (page 670), to 'kievan.
- Set grob property style in Rest (page 689), to 'mensural.
- Set grob property X-offset in Stem (page 715), 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):

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Arpeggio_engraver (page 457)
: Create arpeggiato and non-arpeggiato symbols.

Music types accepted: arpeggio-event (page 51), chord-slur-event (page 52), and non-arpeggiato-event (page 56),

This engraver creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), and ChordSlur (page 574).

Auto_beam_engraver (page 457)

Generate beams based on measure characteristics and observed Stems. Uses beatBase, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Stem_engraver (page 506), properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 52),

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.

beamExceptions (list)
: An alist of exceptions to auto-beam 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.

beatBase (positive exact rational or +inf.0)
: The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
: A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
: If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Beam_engraver (page 463)

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

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

Properties (read)

beamMelismaBusy (boolean)
: Signal if a beam is present.

beatBase (positive exact rational or +inf.0)
: The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
: A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
: If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Bend_engraver (page 465)
Create fall spanners.

Music types accepted: bend-after-event (page 52),

Properties (read)

currentBarLine (graphical (layout) object)
Set to the BarLine that Bar_engraver has created in the current time step.

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 560).

Breathing_sign_engraver (page 466)
Notate breath marks.

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

Properties (read)

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

This engraver creates the following layout object(s): BreathingSign (page 565).

Chord_tremolo_engraver (page 468)
Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 61),

This engraver creates the following layout object(s): Beam (page 557).

Cluster_spanner_engraver (page 469)
Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 52),

This engraver creates the following layout object(s): ClusterSpanner (page 582), and ClusterSpannerBeacon (page 582).

Dots_engraver (page 473)
Create Dots (page 600), objects for rhythmic-head-interface (page 827)s.

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

Double_percent_repeat_engraver (page 473)
Make double measure repeats.

Music types accepted: double-percent-event (page 53),

Properties (read)

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

measureLength (positive exact rational or +inf.0)
The musical length of the current measure.

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 602), and DoublePercentRepeatCounter (page 603).

Dynamic_align_engraver (page 475)
: 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 607).

Dynamic_engraver (page 475)
: Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: absolute-dynamic-event (page 50), break-dynamic-span-event (page 52), and span-dynamic-event (page 59),

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 609), DynamicTextSpanner (page 611), and Hairpin (page 626).

Finger_glide_engraver (page 477)
: Engraver to print a line between two Fingering, StringNumber or StrokeFinger grobs.

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

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

`Fingering_engraver` (page 478)
Create fingering scripts.

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

This engraver creates the following layout object(s): `Fingering` (page 615).

`Font_size_engraver` (page 478)
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 478)
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 480)
Engrave glissandi.

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

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 `'()` defaults to `'((0 . 0) (1 . 1) ... (n . n))`, where *n* is the minimum number of note heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s): `Glissando` (page 622).

`Grace_auto_beam_engraver` (page 480)
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 52),

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 557).

`Grace_beam_engraver` (page 480)
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 51),

Properties (read)

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Grace_engraver` (page 481)
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 482)
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 483)
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 631).

`Kievan_ligature_engraver` (page 486)
Handle `Kievan_ligature_events` by glueing Kievan heads together.

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

This engraver creates the following layout object(s): `KievanLigature` (page 640).

`Laissez_vibrer_engraver` (page 486)
Create laissez vibrer items.

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

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 641), and `LaissezVibrerTieColumn` (page 642).

`Multi_measure_rest_engraver` (page 492)
Engrave multi-measure rests that are produced with 'R'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the `MultiMeasureRest` (page 660).

Music types accepted: `multi-measure-articulation-event` (page 55), `multi-measure-rest-event` (page 55), and `multi-measure-text-event` (page 55),

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 multi-measure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 660), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestScript` (page 664), and `MultiMeasureRestText` (page 665).

`New_fingering_engraver` (page 493)
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 615), `Script` (page 691), `StringNumber` (page 718), and `StrokeFinger` (page 720).

`Note_head_line_engraver` (page 493)
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 756).

Note_heads_engraver (page 494)
Generate note heads.

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

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): ApproximatePitchNoteHead (page 542), and NoteHead (page 670).

Note_spacing_engraver (page 495)
Generate NoteSpacing, an object linking horizontal lines for use in spacing.

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

Part_combine_engraver (page 496)
Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted: note-event (page 56), and part-combine-event (page 57),

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 585).

Percent_repeat_engraver (page 497)
Make whole measure repeats.

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

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 679), and PercentRepeatCounter (page 680).

Phrasing_slur_engraver (page 497)
Print phrasing slurs. Similar to Slur_engraver (page 503).

Music types accepted: note-event (page 56), and phrasing-slur-event (page 57),

This engraver creates the following layout object(s): PhrasingSlur (page 682).

Pitched_trill_engraver (page 499)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), and TrillPitchParentheses (page 745).

Repeat_tie_engraver (page 500)
Create repeat ties.

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

This engraver creates the following layout object(s): RepeatTie (page 688), and RepeatTieColumn (page 689).

Rest_engraver (page 500)
Engrave rests.

Music types accepted: rest-event (page 58),

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 689).

Rhythmic_column_engraver (page 501)
Generate NoteColumn, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): NoteColumn (page 669).

Script_column_engraver (page 501)
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 692).

Script_engraver (page 501)
Handle note scripted articulations.

Music types accepted: articulation-event (page 51),

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 691).

Slash_repeat_engraver (page 503)
Make beat repeats.

Music types accepted: repeat-slash-event (page 58),

This engraver creates the following layout object(s): DoubleRepeatSlash (page 604), and RepeatSlash (page 687).

Slur_engraver (page 503)
Build slur grobs from slur events.

Music types accepted: note-event (page 56), and slur-event (page 59),

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 700).

Spanner_break_forbid_engraver (page 504)
Forbid breaks in certain spanners.

Stem_engraver (page 506)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: tremolo-event (page 61),

Properties (read)

currentBarLine (graphical (layout) object)
Set to the BarLine that Bar_engraver has created in the current time step.

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 617), Stem (page 715), StemStub (page 717), and StemTremolo (page 717).

Text_engraver (page 509)
Create text scripts.

Music types accepted: text-script-event (page 61),

This engraver creates the following layout object(s): TextScript (page 733).

Text_spanner_engraver (page 509)
Create text spanner from an event.

Music types accepted: text-span-event (page 61),

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 735).

Tie_engraver (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: tie-event (page 61),

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 737), and TieColumn (page 739).

Toe_heel_engraver (page 512)
Read the toeHeelStyle context property and use it to style \rtoe and its siblings, based on the data in the toe-heel-styles alist.

Music types accepted: articulation-event (page 51),

Properties (read)

toeHeelStyle (symbol)
The style for the glyph shape and behavior of \rtoe and siblings. Possible values are default, standard, reversed, circleheels, and below. If not set (the default), use value default.

Trill_spanner_engraver (page 512)
Create trill spanners.

Music types accepted: trill-span-event (page 61),

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 746).

Tuplet_engraver (page 512)
Catch tuplet events and generate appropriate bracket.

Music types accepted: tuplet-span-event (page 62),

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 747), and TupletNumber (page 749).

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 630), LyricExtender (page 647), LyricHyphen (page 648), LyricSpace (page 651), LyricText (page 651), StanzaNumber (page 714), VerticalAxisGroup (page 754), and VowelTransition (page 760).

This context sets the following properties:

- Set context property instrumentName to '().
- Set context property lyricRepeatCountFormatter to #<program>.
- Set context property searchForVoice to #f.
- Set context property shortInstrumentName to '().
- Set grob property bar-extent in BarLine (page 547), to :

  ```
  '(-0.05 . 0.05)
  ```
- Set grob property font-size in InstrumentName (page 630), to 1.0.
- Set grob property nonstaff-nonstaff-spacing in VerticalAxisGroup (page 754), to :

  ```
  '((basic-distance . 0)
   (minimum-distance . 2.8)
   (padding . 0.2)
   (stretchability . 0))
  ```
- Set grob property nonstaff-relatedstaff-spacing in VerticalAxisGroup (page 754), to :

  ```
  '((basic-distance . 5.5) (padding . 0.5) (stretchability . 1))
  ```
- Set grob property nonstaff-unrelatedstaff-spacing.padding in VerticalAxisGroup (page 754), to 1.5.
- Set grob property remove-empty in VerticalAxisGroup (page 754), to #t.
- Set grob property remove-first in VerticalAxisGroup (page 754), to #t.
- Set grob property self-alignment-Y in InstrumentName (page 630), to #f.
- Set grob property short-bar-extent in BarLine (page 547), to :

  ```
  '(-0.05 . 0.05)
  ```
- Set grob property staff-affinity in VerticalAxisGroup (page 754), 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 458)

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 754).

Extender_engraver (page 476)
Create lyric extenders.

Music types accepted: completize-extender-event (page 53), extender-event (page 53), hyphen-event (page 54), and lyric-event (page 55),

Properties (read)

autoExtenders (boolean)
Create lyric extenders automatically for syllables in melismata that are not followed by a hyphen.

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

This engraver creates the following layout object(s): LyricExtender (page 647).

Font_size_engraver (page 478)
Put fontSize into font-size grob property.

Properties (read)

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

Hyphen_engraver (page 483)
Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted: hyphen-event (page 54), and vowel-transition-event (page 62),

This engraver creates the following layout object(s): LyricHyphen (page 648), LyricSpace (page 651), and VowelTransition (page 760).

Instrument_name_engraver (page 483)
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 630).

`Lyric_engraver` (page 487)
Engrave text for lyrics.

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

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 651).

`Pure_from_neighbor_engraver` (page 499)
Coordinates items that get their pure heights from their neighbors.

`Stanza_number_engraver` (page 506)
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 714).

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 314).

This context creates the following layout object(s): `Accidental` (page 533), `AccidentalCautionary` (page 534), `AccidentalPlacement` (page 535), `AccidentalSuggestion` (page 536), `BarLine` (page 547), `BassFigure` (page 553), `BassFigureAlignment` (page 553), `BassFigureAlignmentPositioning` (page 554), `BassFigureBracket` (page 555), `BassFigureContinuation` (page 556), `BassFigureLine` (page 556), `BreathingSign` (page 565), `CaesuraScript` (page 568), `Clef` (page 577), `ClefModifier` (page 580), `CueClef` (page 589), `CueEndClef` (page 592), `Custos` (page 595), `DotColumn` (page 600), `FingeringColumn` (page 617), `InstrumentName` (page 630), `KeyCancellation` (page 634), `KeySignature` (page 637), `LedgerLineSpanner` (page 643), `NoteCollision` (page 668), `OptionalMaterialBracket` (page 673), `OttavaBracket` (page 676), `PianoPedalBracket` (page 684), `RestCollision` (page 690), `ScriptColumn` (page 692), `ScriptRow` (page 693), `SignumRepetitionis` (page 697), `SostenutoPedal` (page 702), `SostenutoPedalLineSpanner` (page 704), `StaffEllipsis` (page 708), `StaffHighlight` (page 711), `StaffSpacing` (page 712), `StaffSymbol` (page 713), `SustainPedal` (page 722), `SustainPedalLineSpanner` (page 723), `TimeSignature` (page 739), `UnaCordaPedal` (page 750), `UnaCordaPedalLineSpanner` (page 752), and `VerticalAxisGroup` (page 754).

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 #<program>)
  ```
- 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 `submeasureBarType` to `'()`.
- Set context property `underlyingRepeatBarType` to `'()`.

- Set grob property `hair-thickness` in `BarLine` (page 547), to `0.6`.
- Set grob property `neutral-direction` in `Custos` (page 595), to `-1`.
- Set grob property `neutral-position` in `Custos` (page 595), to `3`.
- Set grob property `style` in `Custos` (page 595), to `'mensural`.
- Set grob property `style` in `TimeSignature` (page 739), to `'mensural`.
- Set grob property `thick-thickness` in `BarLine` (page 547), to `1.8`.
- Set grob property `thickness` in `StaffSymbol` (page 713), to `0.6`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `MensuralVoice` (page 240).

Context `MensuralStaff` can contain `CueVoice` (page 102), `MensuralVoice` (page 240), and `NullVoice` (page 252).

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

`Accidental_engraver` (page 455)
: 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 533), AccidentalCautionary (page 534), AccidentalPlacement (page 535), and AccidentalSuggestion (page 536).

Alteration_glyph_engraver (page 456)
: 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.

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 51),

Axis_group_engraver (page 458)
: 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 754).

`Bar_engraver` (page 459)
: 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 51), `caesura-event` (page 52), `coda-mark-event` (page 52), `dal-segno-event` (page 53), `fine-event` (page 53), `section-event` (page 58), and `segno-mark-event` (page 59),

Properties (read)

`caesuraType` (list)
: An alist

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

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

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

`caesuraTypeTransform` (procedure)
: An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

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

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

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

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

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

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

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`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 time step.

`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 547).

`Caesura_engraver` (page 466)
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 52),

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 565), and CaesuraScript (page 568).

Clef_engraver (page 468)
: 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 577), and `ClefModifier` (page 580).

`Collision_engraver` (page 469)
: 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 668).

`Cue_clef_engraver` (page 471)
: 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 580), `CueClef` (page 589), and `CueEndClef` (page 592).

`Custos_engraver` (page 472)
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.

`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): `Custos` (page 595).

`Dot_column_engraver` (page 473)
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 600).

`Figured_bass_engraver` (page 477)
Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 51), and `rest-event` (page 58),

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 553), `BassFigureAlignment` (page 553), `BassFigureBracket` (page 555), `BassFigureContinuation` (page 556), and `BassFigureLine` (page 556).

`Figured_bass_position_engraver` (page 477)
Position figured bass alignments over notes.

This engraver creates the following layout object(s): `BassFigureAlignmentPositioning` (page 554).

`Fingering_column_engraver` (page 478)
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 617).

`Font_size_engraver` (page 478)
Put `fontSize` into `font-size` grob property.

Properties (read)

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

`Grob_pq_engraver` (page 482)
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.).

`Horizontal_script_engraver` (page 482)
Aligns `Script` horizontally

`Instrument_name_engraver` (page 483)
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 630).

`Key_engraver` (page 485)
Engrave a key signature.

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

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 634), and KeySignature (page 637).

`Ledger_line_engraver` (page 486)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): LedgerLineSpanner (page 643).

`Merge_mmrest_numbers_engraver` (page 491)
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 493)
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 692).

`Optional_material_bracket_engraver` (page 495)
Notate in-staff brackets for optional material.

Music types accepted: `optional-material-event` (page 57),

This engraver creates the following layout object(s): `OptionalMaterialBracket` (page 673).

`Ottava_spanner_engraver` (page 495)
Create a text spanner when the ottavation property changes.

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

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 676).

`Piano_pedal_align_engraver` (page 498)
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 704), `SustainPedalLineSpanner` (page 723), and `UnaCordaPedalLineSpanner` (page 752).

`Piano_pedal_engraver` (page 498)
Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 59), `sustain-event` (page 61), and `una-corda-event` (page 62),

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 684), SostenutoPedal (page 702), SustainPedal (page 722), and UnaCordaPedal (page 750).

Pure_from_neighbor_engraver (page 499)
: Coordinates items that get their pure heights from their neighbors.

Rest_collision_engraver (page 500)
: 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 690).

Script_row_engraver (page 501)
: Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 693).

Separating_line_group_engraver (page 502)
: 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 712).

Signum_repetitionis_engraver (page 502)
: Create a SignumRepetitionis at the end of a \repeat volta section.

Music types accepted: volta-repeat-end-event (page 62),

This engraver creates the following layout object(s): SignumRepetitionis (page 697).

`Skip_typesetting_engraver` (page 502)
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 708).

`Staff_collecting_engraver` (page 505)
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 505)
Highlights music passages.

Music types accepted: `staff-highlight-event` (page 59),

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 711).

`Staff_symbol_engraver` (page 506)
Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): `StaffSymbol` (page 713).

`Time_signature_engraver` (page 510)
Create a `TimeSignature` (page 739), whenever `timeSignature` changes.

Music types accepted: `polymetric-time-signature-event` (page 58), and `reference-time-signature-event` (page 58),

Properties (read)

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

`partialBusy` (boolean)
Signal that \partial acts at the current time step.

`timeSignature` (time signature)
A time-signature specification. See the `\time` command.

This engraver creates the following layout object(s): `TimeSignature` (page 739).

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 444).

This context creates the following layout object(s): ApproximatePitchNoteHead (page 542), Arpeggio (page 544), Beam (page 557), BendAfter (page 560), BreathingSign (page 565), ChordBracket (page 572), ChordSlur (page 574), ClusterSpanner (page 582), ClusterSpannerBeacon (page 582), CombineTextScript (page 585), Dots (page 600), DoublePercentRepeat (page 602), DoublePercentRepeatCounter (page 603), DoubleRepeatSlash (page 604), DynamicLineSpanner (page 607), DynamicText (page 609), DynamicTextSpanner (page 611), FingerGlideSpanner (page 613), Fingering (page 615), Flag (page 617), Glissando (page 622), Hairpin (page 626), InstrumentSwitch (page 631), LaissezVibrerTie (page 641), LaissezVibrerTieColumn (page 642), MensuralLigature (page 658), MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), MultiMeasureRestText (page 665), NoteColumn (page 669), NoteHead (page 670), NoteSpacing (page 672), PercentRepeat (page 679), PercentRepeatCounter (page 680), PhrasingSlur (page 682), RepeatSlash (page 687), RepeatTie (page 688), RepeatTieColumn (page 689), Rest (page 689), Script (page 691), ScriptColumn (page 692), Stem (page 715), StemStub (page 717), StemTremolo (page 717), StringNumber (page 718), StrokeFinger (page 720), TextScript (page 733), TextSpanner (page 735), Tie (page 737), TieColumn (page 739), TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), TrillPitchParentheses (page 745), TrillSpanner (page 746), TupletBracket (page 747), TupletNumber (page 749), and VoiceFollower (page 756).

This context sets the following properties:

- Set context property autoBeaming to #f.
- Set grob property style in Flag (page 617), to 'mensural.
- Set grob property style in NoteHead (page 670), to 'mensural.
- Set grob property style in Rest (page 689), 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):

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Arpeggio_engraver (page 457)
: Create arpeggiato and non-arpeggiato symbols.

  Music types accepted: arpeggio-event (page 51), chord-slur-event (page 52), and non-arpeggiato-event (page 56),

  This engraver creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), and ChordSlur (page 574).

Auto_beam_engraver (page 457)
: Generate beams based on measure characteristics and observed Stems. Uses beatBase, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Stem_engraver (page 506), properties stemLeftBeamCount and stemRightBeamCount.

  Music types accepted: beam-forbid-event (page 52),

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.

`beamExceptions` (list)
An alist of exceptions to auto-beam 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.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Beam_engraver` (page 463)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

Properties (read)

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Bend_engraver` (page 465)
Create fall spanners.

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

Properties (read)

`currentBarLine` (graphical (layout) object)
Set to the `BarLine` that `Bar_engraver` has created in the current time step.

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 560).

Breathing_sign_engraver (page 466)
Notate breath marks.

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

Properties (read)

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

This engraver creates the following layout object(s): BreathingSign (page 565).

Chord_tremolo_engraver (page 468)
Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 61),

This engraver creates the following layout object(s): Beam (page 557).

Cluster_spanner_engraver (page 469)
Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 52),

This engraver creates the following layout object(s): ClusterSpanner (page 582), and ClusterSpannerBeacon (page 582).

Dots_engraver (page 473)
Create Dots (page 600), objects for rhythmic-head-interface (page 827)s.

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

Double_percent_repeat_engraver (page 473)
Make double measure repeats.

Music types accepted: double-percent-event (page 53),

Properties (read)

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

measureLength (positive exact rational or +inf.0)
The musical length of the current measure.

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 602), and DoublePercentRepeatCounter (page 603).

`Dynamic_align_engraver` (page 475)
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 607).

`Dynamic_engraver` (page 475)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 50), `break-dynamic-span-event` (page 52), and `span-dynamic-event` (page 59),

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 609), `DynamicTextSpanner` (page 611), and `Hairpin` (page 626).

`Finger_glide_engraver` (page 477)
Engraver to print a line between two `Fingering`, `StringNumber` or `StrokeFinger` grobs.

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

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

`Fingering_engraver` (page 478)
Create fingering scripts.

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

This engraver creates the following layout object(s): `Fingering` (page 615).

`Font_size_engraver` (page 478)
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 478)
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 480)
Engrave glissandi.

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

Properties (read)

glissandoMap (list)
A map in the form of '((source1 . target1) (source2 . target2) ... (source*n* . target*n*)), showing the glissandi to be drawn for note columns. The value '() defaults to '((0 . 0) (1 . 1) ... (*n* . *n*)), where *n* is the minimum number of note heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s): Glissando (page 622).

Grace_auto_beam_engraver (page 480)
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 52),

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 557).

Grace_beam_engraver (page 480)
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 51),

Properties (read)

beamMelismaBusy (boolean)
Signal if a beam is present.

beatBase (positive exact rational or +inf.0)
The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
: If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Grace_engraver (page 481)
: 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 482)
: 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 483)
: 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 631).

Laissez_vibrer_engraver (page 486)
: Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 54),

This engraver creates the following layout object(s): LaissezVibrerTie (page 641), and LaissezVibrerTieColumn (page 642).

Mensural_ligature_engraver (page 491)
: Handle Mensural_ligature_events by glueing special ligature heads together.

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

This engraver creates the following layout object(s): MensuralLigature (page 658).

Multi_measure_rest_engraver (page 492)
: Engrave multi-measure rests that are produced with 'R'. It reads measureStartNow and internalBarNumber to determine what number to print over the MultiMeasureRest (page 660).

Music types accepted: multi-measure-articulation-event (page 55), multi-measure-rest-event (page 55), and multi-measure-text-event (page 55),

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 multi-measure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), and MultiMeasureRestText (page 665).

New_fingering_engraver (page 493)
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 615), Script (page 691), StringNumber (page 718), and StrokeFinger (page 720).

Note_head_line_engraver (page 493)
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 756).

Note_heads_engraver (page 494)
Generate note heads.

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

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): ApproximatePitchNoteHead (page 542), and NoteHead (page 670).

Note_spacing_engraver (page 495)
Generate NoteSpacing, an object linking horizontal lines for use in spacing.

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

Part_combine_engraver (page 496)
Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted: note-event (page 56), and part-combine-event (page 57),

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 585).

Percent_repeat_engraver (page 497)
Make whole measure repeats.

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

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 679), and PercentRepeatCounter (page 680).

Phrasing_slur_engraver (page 497)
Print phrasing slurs. Similar to Slur_engraver (page 503).

Music types accepted: note-event (page 56), and phrasing-slur-event (page 57),

This engraver creates the following layout object(s): PhrasingSlur (page 682).

`Pitched_trill_engraver` (page 499)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 742), `TrillPitchGroup` (page 743), `TrillPitchHead` (page 744), and `TrillPitchParentheses` (page 745).

`Repeat_tie_engraver` (page 500)
Create repeat ties.

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

This engraver creates the following layout object(s): `RepeatTie` (page 688), and `RepeatTieColumn` (page 689).

`Rest_engraver` (page 500)
Engrave rests.

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

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 689).

`Rhythmic_column_engraver` (page 501)
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 669).

`Script_column_engraver` (page 501)
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 692).

`Script_engraver` (page 501)
Handle note scripted articulations.

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

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 691).

`Slash_repeat_engraver` (page 503)
Make beat repeats.

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

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 604), and `RepeatSlash` (page 687).

`Spanner_break_forbid_engraver` (page 504)
Forbid breaks in certain spanners.

`Stem_engraver` (page 506)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 61),

Properties (read)

`currentBarLine` (graphical (layout) object)
Set to the `BarLine` that `Bar_engraver` has created in the current time step.

`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 617), `Stem` (page 715), `StemStub` (page 717), and `StemTremolo` (page 717).

`Text_engraver` (page 509)
Create text scripts.

Music types accepted: `text-script-event` (page 61),

This engraver creates the following layout object(s): `TextScript` (page 733).

`Text_spanner_engraver` (page 509)
Create text spanner from an event.

Music types accepted: `text-span-event` (page 61),

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 735).

`Tie_engraver` (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 61),

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 737), and `TieColumn` (page 739).

`Toe_heel_engraver` (page 512)
Read the `toeHeelStyle` context property and use it to style `\rtoe` and its siblings, based on the data in the `toe-heel-styles` alist.

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

Properties (read)

`toeHeelStyle` (symbol)
The style for the glyph shape and behavior of `\rtoe` and siblings. Possible values are `default`, `standard`, `reversed`, `circleheels`, and `below`. If not set (the default), use value `default`.

`Trill_spanner_engraver` (page 512)
Create trill spanners.

Music types accepted: `trill-span-event` (page 61),

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 746).

`Tuplet_engraver` (page 512)
Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 62),

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 747), and `TupletNumber` (page 749).

2.1.24 NoteNames

Typesets note names.

This context also accepts commands for the following context(s): `Staff` (page 314).

This context creates the following layout object(s): `NoteName` (page 671), `StaffSpacing` (page 712), `Tie` (page 737), `TieColumn` (page 739), and `VerticalAxisGroup` (page 754).

This context sets the following properties:

- Set grob property `nonstaff-nonstaff-spacing` in `VerticalAxisGroup` (page 754), to :
```
'((basic-distance . 0)
 (minimum-distance . 2.8)
 (padding . 0.2)
 (stretchability . 0))
```
- Set grob property `nonstaff-relatedstaff-spacing` in `VerticalAxisGroup` (page 754), to :
```
'((basic-distance . 5.5) (padding . 0.5) (stretchability . 1))
```
- Set grob property `nonstaff-unrelatedstaff-spacing.padding` in `VerticalAxisGroup` (page 754), to `1.5`.
- Set grob property `staff-affinity` in `VerticalAxisGroup` (page 754), 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 456)
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 458)
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 754).

`Note_name_engraver` (page 494)
Print pitches as words.

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

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 671).

`Separating_line_group_engraver` (page 502)
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 712).

`Tie_engraver` (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 61),

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 737), and `TieColumn` (page 739).

2.1.25 NullVoice

For aligning lyrics without printing notes.

This context also accepts commands for the following context(s): `Staff` (page 314), and `Voice` (page 444).

This context creates the following layout object(s): `ApproximatePitchNoteHead` (page 542), `Beam` (page 557), `NoteHead` (page 670), `Slur` (page 700), `Tie` (page 737), and `TieColumn` (page 739).

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 670), to `#t`.
- Set grob property `stencil` in `Beam` (page 557), to `#f`.
- Set grob property `stencil` in `NoteHead` (page 670), to `#f`.
- Set grob property `stencil` in `Slur` (page 700), to `#f`.
- Set grob property `stencil` in `Tie` (page 737), to `#f`.
- Set grob property `X-extent` in `NoteHead` (page 670), to `#<program>`.

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 463)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

Properties (read)

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Grob_pq_engraver` (page 482)
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

`Note_heads_engraver` (page 494)
Generate note heads.

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

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): `ApproximatePitchNoteHead` (page 542), and `NoteHead` (page 670).

`Pitch_squash_engraver` (page 499)
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 503)
Build slur grobs from slur events.

Music types accepted: note-event (page 56), and slur-event (page 59),

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 700).

Tie_engraver (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: tie-event (page 61),

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 737), and TieColumn (page 739).

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 754).

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Staff (page 314).

Context OneStaff can contain ChordNames (page 100), DrumStaff (page 113), Dynamics (page 133), FiguredBass (page 138), FretBoards (page 140), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), NoteNames (page 250), PetrucciStaff (page 255), RhythmicStaff (page 283), Staff (page 314), TabStaff (page 370), VaticanaLyrics (page 393), and VaticanaStaff (page 419).

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

`Axis_group_engraver` (page 458)
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 754).

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 314).

This context creates the following layout object(s): `Accidental` (page 533), `AccidentalCautionary` (page 534), `AccidentalPlacement` (page 535), `AccidentalSuggestion` (page 536), `BarLine` (page 547), `BassFigure` (page 553), `BassFigureAlignment` (page 553), `BassFigureAlignmentPositioning` (page 554), `BassFigureBracket` (page 555), `BassFigureContinuation` (page 556), `BassFigureLine` (page 556), `BreathingSign` (page 565), `CaesuraScript` (page 568), `Clef` (page 577), `ClefModifier` (page 580), `CueClef` (page 589), `CueEndClef` (page 592), `Custos` (page 595), `DotColumn` (page 600), `FingeringColumn` (page 617), `InstrumentName` (page 630), `KeyCancellation` (page 634), `KeySignature` (page 637), `LedgerLineSpanner` (page 643), `NoteCollision` (page 668), `OptionalMaterialBracket` (page 673), `OttavaBracket` (page 676), `PianoPedalBracket` (page 684), `RestCollision` (page 690), `ScriptColumn` (page 692), `ScriptRow` (page 693), `SignumRepetitionis` (page 697), `SostenutoPedal` (page 702), `SostenutoPedalLineSpanner` (page 704), `StaffEllipsis` (page 708), `StaffHighlight` (page 711), `StaffSpacing` (page 712), `StaffSymbol` (page 713), `SustainPedal` (page 722), `SustainPedalLineSpanner` (page 723), `TimeSignature` (page 739), `UnaCordaPedal` (page 750), `UnaCordaPedalLineSpanner` (page 752), and `VerticalAxisGroup` (page 754).

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 #<program>
     #<program>)
```

- Set context property autoAccidentals to:
  '(Staff #<program>)
- 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 submeasureBarType to '().
- Set context property underlyingRepeatBarType to '().
- Set grob property bar-extent in BarLine (page 547), to :
  '(-2.5 . 2.5)
- Set grob property bar-extent in SignumRepetitionis (page 697), to :
  '(-2.5 . 2.5)

- Set grob property hair-thickness in BarLine (page 547), to 2.21.
- Set grob property hair-thickness in SignumRepetitionis (page 697), to 2.21.
- Set grob property kern in BarLine (page 547), to 2.9.
- Set grob property kern in SignumRepetitionis (page 697), to 2.9.
- Set grob property neutral-direction in Custos (page 595), to -1.
- Set grob property neutral-position in Custos (page 595), to 3.
- Set grob property rounded in BarLine (page 547), to #t.
- Set grob property rounded in SignumRepetitionis (page 697), to #t.
- Set grob property short-bar-extent in BarLine (page 547), to : '(-1.5 . 1.5)
- Set grob property short-bar-extent in SignumRepetitionis (page 697), to : '(-1.5 . 1.5)
- Set grob property style in Custos (page 595), to 'mensural.
- Set grob property style in TimeSignature (page 739), to 'mensural.
- Set grob property thick-thickness in BarLine (page 547), to 2.9.
- Set grob property thick-thickness in SignumRepetitionis (page 697), to 2.9.
- Set grob property thickness in StaffSymbol (page 713), 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 270).

Context PetrucciStaff can contain CueVoice (page 102), NullVoice (page 252), and PetrucciVoice (page 270).

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

Accidental_engraver (page 455)

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 533), `AccidentalCautionary` (page 534), `AccidentalPlacement` (page 535), and `AccidentalSuggestion` (page 536).

`Alteration_glyph_engraver` (page 456)
: 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.

`Apply_output_engraver` (page 457)
Apply a procedure to any grob acknowledged.

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

`Axis_group_engraver` (page 458)
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 754).

`Bar_engraver` (page 459)
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 51), `caesura-event` (page 52), `coda-mark-event` (page 52), `dal-segno-event` (page 53), `fine-event` (page 53), `section-event` (page 58), and `segno-mark-event` (page 59),

Properties (read)

`caesuraType` (list)
An alist

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

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

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

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

The first argument is the context.

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

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

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

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

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

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

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
: Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`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 time step.

`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 547).

Caesura_engraver (page 466)

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 52),

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 565), and CaesuraScript (page 568).

Clef_engraver (page 468)

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 577), and ClefModifier (page 580).

Collision_engraver (page 469)
: 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 668).

Cue_clef_engraver (page 471)
: 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 580), `CueClef` (page 589), and `CueEndClef` (page 592).

`Custos_engraver` (page 472)
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.

`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): `Custos` (page 595).

`Dot_column_engraver` (page 473)
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 600).

`Figured_bass_engraver` (page 477)
Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 51), and `rest-event` (page 58),

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 553), BassFigureAlignment (page 553), BassFigureBracket (page 555), BassFigureContinuation (page 556), and BassFigureLine (page 556).

Figured_bass_position_engraver (page 477)
Position figured bass alignments over notes.

This engraver creates the following layout object(s): BassFigureAlignmentPositioning (page 554).

Fingering_column_engraver (page 478)
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 617).

Font_size_engraver (page 478)
Put fontSize into font-size grob property.

Properties (read)

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

Grob_pq_engraver (page 482)
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.).

Horizontal_script_engraver (page 482)
Aligns Script horizontally

Instrument_name_engraver (page 483)
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 630).

`Key_engraver` (page 485)
Engrave a key signature.

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

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 634), and `KeySignature` (page 637).

`Ledger_line_engraver` (page 486)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 643).

`Merge_mmrest_numbers_engraver` (page 491)
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 493)
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 692).

`Optional_material_bracket_engraver` (page 495)
Notate in-staff brackets for optional material.

Music types accepted: `optional-material-event` (page 57),

This engraver creates the following layout object(s): `OptionalMaterialBracket` (page 673).

`Ottava_spanner_engraver` (page 495)
Create a text spanner when the ottavation property changes.

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

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 676).

`Piano_pedal_align_engraver` (page 498)
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 704), `SustainPedalLineSpanner` (page 723), and `UnaCordaPedalLineSpanner` (page 752).

`Piano_pedal_engraver` (page 498)
Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 59), `sustain-event` (page 61), and `una-corda-event` (page 62),

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 684), `SostenutoPedal` (page 702), `SustainPedal` (page 722), and `UnaCordaPedal` (page 750).

`Pure_from_neighbor_engraver` (page 499)
Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 500)
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 690).

`Script_row_engraver` (page 501)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 693).

`Separating_line_group_engraver` (page 502)
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 712).

Signum_repetitionis_engraver (page 502)
Create a SignumRepetitionis at the end of a \repeat volta section.

Music types accepted: volta-repeat-end-event (page 62),

This engraver creates the following layout object(s): SignumRepetitionis (page 697).

Skip_typesetting_engraver (page 502)
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 708).

Staff_collecting_engraver (page 505)
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 505)
Highlights music passages.

Music types accepted: staff-highlight-event (page 59),

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 711).

Staff_symbol_engraver (page 506)
Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): StaffSymbol (page 713).

Time_signature_engraver (page 510)
Create a TimeSignature (page 739), whenever timeSignature changes.

Music types accepted: polymetric-time-signature-event (page 58), and reference-time-signature-event (page 58),

Properties (read)

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

partialBusy (boolean)
: Signal that \partial acts at the current time step.

timeSignature (time signature)
: A time-signature specification. See the \time command.

This engraver creates the following layout object(s): TimeSignature (page 739).

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 444).

This context creates the following layout object(s): ApproximatePitchNoteHead (page 542), Arpeggio (page 544), Beam (page 557), BendAfter (page 560), BreathingSign (page 565), ChordBracket (page 572), ChordSlur (page 574), ClusterSpanner (page 582), ClusterSpannerBeacon (page 582), CombineTextScript (page 585), Dots (page 600), DoublePercentRepeat (page 602), DoublePercentRepeatCounter (page 603), DoubleRepeatSlash (page 604), DynamicLineSpanner (page 607), DynamicText (page 609), DynamicTextSpanner (page 611), FingerGlideSpanner (page 613), Fingering (page 615), Flag (page 617), Glissando (page 622), Hairpin (page 626), InstrumentSwitch (page 631), LaissezVibrerTie (page 641), LaissezVibrerTieColumn (page 642), MensuralLigature (page 658), MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), MultiMeasureRestText (page 665), NoteColumn (page 669), NoteHead (page 670), NoteSpacing (page 672), PercentRepeat (page 679), PercentRepeatCounter (page 680), PhrasingSlur (page 682), RepeatSlash (page 687), RepeatTie (page 688), RepeatTieColumn (page 689), Rest (page 689), Script (page 691), ScriptColumn (page 692), Slur (page 700), Stem (page 715), StemStub (page 717), StemTremolo (page 717), StringNumber (page 718), StrokeFinger (page 720), TextScript (page 733), TextSpanner (page 735), Tie (page 737), TieColumn (page 739), TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), TrillPitchParentheses (page 745), TrillSpanner (page 746), TupletBracket (page 747), TupletNumber (page 749), and VoiceFollower (page 756).

This context sets the following properties:

- Set context property autoBeaming to #f.
- Set grob property length in Stem (page 715), to 5.
- Set grob property style in Flag (page 617), to 'mensural.
- Set grob property style in NoteHead (page 670), to 'petrucci.
- Set grob property style in Rest (page 689), to 'mensural.
- Set grob property thickness in Stem (page 715), 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):

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Arpeggio_engraver (page 457)
: Create arpeggiato and non-arpeggiato symbols.

  Music types accepted: arpeggio-event (page 51), chord-slur-event (page 52), and non-arpeggiato-event (page 56),

This engraver creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), and ChordSlur (page 574).

Auto_beam_engraver (page 457)
: Generate beams based on measure characteristics and observed Stems. Uses beatBase, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Stem_engraver (page 506), properties stemLeftBeamCount and stemRightBeamCount.

  Music types accepted: beam-forbid-event (page 52),

  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.

  beamExceptions (list)
  : An alist of exceptions to auto-beam 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.

  beatBase (positive exact rational or +inf.0)
  : The musical length corresponding to one unit of beatStructure.

  beatStructure (number list)
  : A sequence describing the length of each beat in the measure in units of beatBase.

  subdivideBeams (boolean)
  : If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

  This engraver creates the following layout object(s): Beam (page 557).

Beam_engraver (page 463)
: Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

  Properties (read)

  beamMelismaBusy (boolean)
  : Signal if a beam is present.

  beatBase (positive exact rational or +inf.0)
  : The musical length corresponding to one unit of beatStructure.

  beatStructure (number list)
  : A sequence describing the length of each beat in the measure in units of beatBase.

  subdivideBeams (boolean)
  : If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

  This engraver creates the following layout object(s): Beam (page 557).

Bend_engraver (page 465)
Create fall spanners.
Music types accepted: bend-after-event (page 52),
Properties (read)
currentBarLine (graphical (layout) object)
Set to the BarLine that Bar_engraver has created in the current time step.
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 560).

Breathing_sign_engraver (page 466)
Notate breath marks.
Music types accepted: breathing-event (page 52),
Properties (read)
breathMarkType (symbol)
The type of BreathingSign to create at \breathe.
This engraver creates the following layout object(s): BreathingSign (page 565).

Chord_tremolo_engraver (page 468)
Generate beams for tremolo repeats.
Music types accepted: tremolo-span-event (page 61),
This engraver creates the following layout object(s): Beam (page 557).

Cluster_spanner_engraver (page 469)
Engrave a cluster using Spanner notation.
Music types accepted: cluster-note-event (page 52),
This engraver creates the following layout object(s): ClusterSpanner (page 582), and ClusterSpannerBeacon (page 582).

Dots_engraver (page 473)
Create Dots (page 600), objects for rhythmic-head-interface (page 827)s.
This engraver creates the following layout object(s): Dots (page 600).

Double_percent_repeat_engraver (page 473)
Make double measure repeats.
Music types accepted: double-percent-event (page 53),
Properties (read)
countPercentRepeats (boolean)
If set, produce counters for percent repeats.
measureLength (positive exact rational or +inf.0)
The musical length of the current measure.
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 602), and `DoublePercentRepeatCounter` (page 603).

`Dynamic_align_engraver` (page 475)
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 607).

`Dynamic_engraver` (page 475)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 50), `break-dynamic-span-event` (page 52), and `span-dynamic-event` (page 59),

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 609), `DynamicTextSpanner` (page 611), and `Hairpin` (page 626).

`Finger_glide_engraver` (page 477)
Engraver to print a line between two `Fingering`, `StringNumber` or `StrokeFinger` grobs.

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

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

`Fingering_engraver` (page 478)
Create fingering scripts.

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

This engraver creates the following layout object(s): `Fingering` (page 615).

`Font_size_engraver` (page 478)
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 478)
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 480)
Engrave glissandi.

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

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 `'()` defaults to `'((0 . 0) (1 . 1) ... (n . n))`, where *n* is the minimum number of note heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s): `Glissando` (page 622).

`Grace_auto_beam_engraver` (page 480)
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 52),

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 557).

`Grace_beam_engraver` (page 480)
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 51),

Properties (read)

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Grace_engraver` (page 481)
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 482)
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 483)
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 631).

`Laissez_vibrer_engraver` (page 486)
Create laissez vibrer items.

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

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 641), and `LaissezVibrerTieColumn` (page 642).

`Mensural_ligature_engraver` (page 491)
Handle `Mensural_ligature_events` by glueing special ligature heads together.

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

This engraver creates the following layout object(s): `MensuralLigature` (page 658).

`Multi_measure_rest_engraver` (page 492)
Engrave multi-measure rests that are produced with 'R'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the `MultiMeasureRest` (page 660).

Music types accepted: `multi-measure-articulation-event` (page 55), `multi-measure-rest-event` (page 55), and `multi-measure-text-event` (page 55),

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 multi-measure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 660), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestScript` (page 664), and `MultiMeasureRestText` (page 665).

`New_fingering_engraver` (page 493)
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 615), `Script` (page 691), `StringNumber` (page 718), and `StrokeFinger` (page 720).

`Note_head_line_engraver` (page 493)
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 756).

`Note_heads_engraver` (page 494)
Generate note heads.

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

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): ApproximatePitchNoteHead (page 542), and NoteHead (page 670).

Note_spacing_engraver (page 495)
: Generate NoteSpacing, an object linking horizontal lines for use in spacing.

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

Part_combine_engraver (page 496)
: Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted: note-event (page 56), and part-combine-event (page 57),

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 585).

Percent_repeat_engraver (page 497)
: Make whole measure repeats.

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

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 679), and PercentRepeatCounter (page 680).

Phrasing_slur_engraver (page 497)
Print phrasing slurs. Similar to Slur_engraver (page 503).

Music types accepted: note-event (page 56), and phrasing-slur-event (page 57),

This engraver creates the following layout object(s): PhrasingSlur (page 682).

Pitched_trill_engraver (page 499)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), and TrillPitchParentheses (page 745).

Repeat_tie_engraver (page 500)
Create repeat ties.

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

This engraver creates the following layout object(s): RepeatTie (page 688), and RepeatTieColumn (page 689).

Rest_engraver (page 500)
Engrave rests.

Music types accepted: rest-event (page 58),

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 689).

Rhythmic_column_engraver (page 501)
Generate NoteColumn, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): NoteColumn (page 669).

Script_column_engraver (page 501)
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 692).

Script_engraver (page 501)
Handle note scripted articulations.

Music types accepted: articulation-event (page 51),

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 691).

Slash_repeat_engraver (page 503)
Make beat repeats.

Music types accepted: repeat-slash-event (page 58),

This engraver creates the following layout object(s): DoubleRepeatSlash (page 604), and RepeatSlash (page 687).

Slur_engraver (page 503)
Build slur grobs from slur events.

Music types accepted: note-event (page 56), and slur-event (page 59),

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 700).

Spanner_break_forbid_engraver (page 504)
Forbid breaks in certain spanners.

Stem_engraver (page 506)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: tremolo-event (page 61),

Properties (read)

currentBarLine (graphical (layout) object)
Set to the BarLine that Bar_engraver has created in the current time step.

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 617), Stem (page 715), StemStub (page 717), and StemTremolo (page 717).

Text_engraver (page 509)
Create text scripts.

Music types accepted: text-script-event (page 61),

This engraver creates the following layout object(s): TextScript (page 733).

Text_spanner_engraver (page 509)
Create text spanner from an event.

Music types accepted: text-span-event (page 61),

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 735).

`Tie_engraver` (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 61),

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 737), and `TieColumn` (page 739).

`Toe_heel_engraver` (page 512)
Read the `toeHeelStyle` context property and use it to style `\rtoe` and its siblings, based on the data in the `toe-heel-styles` alist.

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

Properties (read)

`toeHeelStyle` (symbol)
The style for the glyph shape and behavior of `\rtoe` and siblings. Possible values are `default`, `standard`, `reversed`, `circleheels`, and `below`. If not set (the default), use value `default`.

`Trill_spanner_engraver` (page 512)
Create trill spanners.

Music types accepted: `trill-span-event` (page 61),

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 746).

`Tuplet_engraver` (page 512)
Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 62),

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 747), and `TupletNumber` (page 749).

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 142).

This context creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), ChordSlur (page 574), InstrumentName (page 630), SpanBar (page 706), SpanBarStub (page 707), StaffGrouper (page 710), SystemStartBar (page 725), SystemStartBrace (page 726), SystemStartBracket (page 727), SystemStartSquare (page 728), and VerticalAlignment (page 753).

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 609), to #f.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Staff (page 314).

Context PianoStaff can contain ChoirStaff (page 69), ChordNames (page 100), Devnull (page 113), DrumStaff (page 113), Dynamics (page 133), FiguredBass (page 138), FretBoards (page 140), GrandStaff (page 142), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), NoteNames (page 250), OneStaff (page 254), PetrucciStaff (page 255), PianoStaff (page 281), RhythmicStaff (page 283), Staff (page 314), StaffGroup (page 327), TabStaff (page 370), VaticanaLyrics (page 393), and VaticanaStaff (page 419).

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

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Instrument_name_engraver (page 483)
: 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 630).

Keep_alive_together_engraver (page 485)
: 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.

Span_arpeggio_engraver (page 504)
: Make arpeggios, non-arpeggiato brackets, and vertical slurs spanning multiple staves.

  Properties (read)

  connectArpeggios (boolean)
  : If set, connect arpeggios across piano staff.

  connectChordBrackets (boolean)
  : If set, connect chord brackets across piano staff.

  connectChordSlurs (boolean)
  : If set, connect chord slurs across piano staff.

  This engraver creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), and ChordSlur (page 574).

Span_bar_engraver (page 504)
: 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 706).

Span_bar_stub_engraver (page 504)
: Make stubs for span bars in all contexts that the span bars cross.

  This engraver creates the following layout object(s): SpanBarStub (page 707).

System_start_delimiter_engraver (page 507)
: 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 725), SystemStartBrace (page 726), SystemStartBracket (page 727), and SystemStartSquare (page 728).

`Vertical_align_engraver` (page 513)
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 710), and `VerticalAlignment` (page 753).

2.1.30 RhythmicStaff

Like `Staff` but for printing rhythms. Pitches are ignored when engraving; the notes are printed on one line. The MIDI rendition retains pitches unchanged.

This context also accepts commands for the following context(s): `Staff` (page 314).

This context creates the following layout object(s): `BarLine` (page 547), `BreathingSign` (page 565), `CaesuraScript` (page 568), `DotColumn` (page 600), `InstrumentName` (page 630), `LedgerLineSpanner` (page 643), `StaffHighlight` (page 711), `StaffSpacing` (page 712), `StaffSymbol` (page 713), `TimeSignature` (page 739), and `VerticalAxisGroup` (page 754).

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 713), to `1`.
- Set grob property `neutral-direction` in `Beam` (page 557), to `1`.
- Set grob property `neutral-direction` in `Stem` (page 715), to `1`.
- Set grob property `staff-padding` in `VoltaBracket` (page 757), to `3`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type `Voice` (page 444).

Context `RhythmicStaff` can contain `CueVoice` (page 102), `NullVoice` (page 252), and `Voice` (page 444).

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

`Apply_output_engraver` (page 457)
Apply a procedure to any grob acknowledged.

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

`Axis_group_engraver` (page 458)
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 754).

`Bar_engraver` (page 459)
: 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 51), `caesura-event` (page 52), `coda-mark-event` (page 52), `dal-segno-event` (page 53), `fine-event` (page 53), `section-event` (page 58), and `segno-mark-event` (page 59),

Properties (read)

`caesuraType` (list)
: An alist

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

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

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

`caesuraTypeTransform` (procedure)
: An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

The first argument is the context.

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

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

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

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

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

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

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`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 time step.

`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 547).

`Caesura_engraver` (page 466)
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 52),

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 565), and CaesuraScript (page 568).

Dot_column_engraver (page 473)
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 600).

Font_size_engraver (page 478)
Put fontSize into font-size grob property.

Properties (read)

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

Instrument_name_engraver (page 483)
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 630).

`Ledger_line_engraver` (page 486)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 643).

`Pitch_squash_engraver` (page 499)
: 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 502)
: 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 712).

`Staff_highlight_engraver` (page 505)
: Highlights music passages.

Music types accepted: `staff-highlight-event` (page 59),

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 711).

`Staff_symbol_engraver` (page 506)
: Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): `StaffSymbol` (page 713).

`Time_signature_engraver` (page 510)

Create a `TimeSignature` (page 739), whenever `timeSignature` changes.

Music types accepted: `polymetric-time-signature-event` (page 58), and `reference-time-signature-event` (page 58),

Properties (read)

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

`partialBusy` (boolean)
Signal that \partial acts at the current time step.

`timeSignature` (time signature)
A time-signature specification. See the `\time` command.

This engraver creates the following layout object(s): `TimeSignature` (page 739).

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 called `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 289).

This context creates the following layout object(s): `BarNumber` (page 551), `BreakAlignGroup` (page 563), `BreakAlignment` (page 564), `CenteredBarNumber` (page 569), `CenteredBarNumberLineSpanner` (page 570), `CodaMark` (page 583), `ControlPoint` (page 587), `ControlPolygon` (page 588), `Footnote` (page 618), `GraceSpacing` (page 623), `JumpScript` (page 633), `LeftEdge` (page 643), `MetronomeMark` (page 658), `NonMusicalPaperColumn` (page 667), `PaperColumn` (page 677), `Parentheses` (page 678), `RehearsalMark` (page 685), `SectionLabel` (page 693), `SegnoMark` (page 695), `SpacingSpanner` (page 705), `StaffGrouper` (page 710), `SystemStartBar` (page 725), `SystemStartBrace` (page 726), `SystemStartBracket` (page 727), `SystemStartSquare` (page 728), `TextMark` (page 731), `VerticalAlignment` (page 753), `VoltaBracket` (page 757), and `VoltaBracketSpanner` (page 758).

This context sets the following properties:

- Set context property `additionalPitchPrefix` to `"add"`.
- 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 #<program>)`
- Set context property `autoBeamCheck` to `default-auto-beam-check`.
- Set context property `autoBeaming` to `#t`.

- Set context property autoCautionaries to '().
- 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 #<program>
      "scripts.raltcomma"))
 (caesura
  (text #<program>
      "scripts.caesura.straight"))
 (chantdoublebar
  (extra-spacing-width -1.0 . 0.0)
  (stencil . #<program>)
  (Y-offset . 0.0))
 (chantfullbar
  (extra-spacing-width -1.0 . 0.0)
  (stencil . #<program>)
  (Y-offset . 0.0))
 (chanthalfbar
  (extra-spacing-height . #<program>)
  (extra-spacing-width -1.0 . 0.0)
  (stencil . #<program>)
  (Y-offset . 0.0))
 (chantquarterbar
  (extra-spacing-height . #<program>)
  (extra-spacing-width -1.0 . 0.0)
  (stencil . #<program>))
 (comma (text #<program>
         "scripts.rcomma"))
 (curvedcaesura
  (text #<program>
      "scripts.caesura.curved"))
 (outsidecomma
  (outside-staff-priority . 40)
  (text #<program> "scripts.rcomma"))
 (spacer (text #<program>))
 (tickmark
  (outside-staff-priority . 40)
  (text #<program>
      "scripts.tickmark"))
 (upbow (outside-staff-priority . 40)
      (text #<program>
          "scripts.uupbow"))
 (varcomma
  (text #<program>
      "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' >)
  #<program>
  ("+"))
 ((#<Pitch ees' > #<Pitch ges' >)
  #<program>
  ((#<program>
    ((#<program> 2 "°")))))
 ((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >)
  #<program>
  ((#<program> "ø")))
 ((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >)
  #<program>
  ((#<program>
    ((#<program> 2 "°")))
   (#<program> "7")))
 ((#<Pitch e' >
   #<Pitch g' >
   #<Pitch bes' >
   #<Pitch des'' >
   #<Pitch ees'' >
   #<Pitch fis'' >
   #<Pitch aes'' >)
  #<program>
  ((#<program> "alt")))
 ((#<Pitch g' >)
  #<program>
  ((#<program> "5")))
 ((#<Pitch g' > #<Pitch c'' >)
  #<program>
  ((#<program> "5"))))
```

- Set context property chordNameFunction to ignatzek-chord-names.
- Set context property chordNameLowercaseMinor to #f.
- Set context property chordNameSeparator to:

```
'(#<program> 0.5)
```

- Set context property chordNoteNamer to #<program>.
- Set context property chordPrefixSpacer to 0.
- Set context property chordRootNamer to #<program>.
- 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 #<program>.
- 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 deprecatedBarCheckSynchronize to #f.
- 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:

```
'(#<program>
 ((#<program>
  -3
  (#<program> #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:

```
'("Sost. Ped." "*Sost. Ped." "*")
```

- Set context property `pedalSostenutoStyle` to `'mixed`.
- Set context property `pedalSustainStrings` to:

```
'("Ped." "*Ped." "*")
```

- Set context property `pedalSustainStyle` to `'text`.
- Set context property `pedalUnaCordaStrings` to:

```
'("una corda" "" "tre corde")
```

- Set context property `pedalUnaCordaStyle` to `'text`.
- Set context property `predefinedDiagramTable` to `#f`.
- Set context property `printAccidentalNames` to `#t`.
- Set context property `printKeyCancellation` to `#t`.
- Set context property `printOctaveNames` to `#f`.
- Set context property `printPartCombineTexts` to `#t`.
- Set context property `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 #<program>.
- 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-axis . 1)
  (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)
  (side-axis . 1)
  (direction . 1))
 (altcomma
  (script-stencil feta "laltcomma" . "raltcomma")
  (quantize-position . #t)
  (padding . 0.2)
  (avoid-slur . ignore)
  (side-axis . 1)
  (direction . 1))
 (bachschleifer
  (script-stencil feta "bachschleifer" . "bachschleifer")
  (no-ledgers . #f)
  (padding . 0.8)
  (length-fraction . 1.5)
  (avoid-slur . around)
  (side-axis . 0)
  (direction . -1)
  (staff-position . #<program>))
 (circulus
  (script-stencil feta "circulus" . "circulus")
  (side-relative-direction . -1)
  (avoid-slur . ignore)
  (padding . 0.2)
  (quantize-position . #t)
  (script-priority . -100)
  (side-axis . 1)
  (direction . 1))
 (coda (script-stencil feta "coda" . "coda")
     (padding . 0.2)
     (avoid-slur . outside)
```

```
    (side-axis . 1)
    (direction . 1))
(comma (script-stencil feta "lcomma" . "rcomma")
     (quantize-position . #t)
     (padding . 0.2)
     (avoid-slur . ignore)
     (side-axis . 1)
     (direction . 1))
(downbow
 (script-stencil feta "ddownbow" . "udownbow")
 (padding . 0.2)
 (skyline-horizontal-padding . 0.2)
 (avoid-slur . around)
 (direction . 1)
 (side-axis . 1)
 (script-priority . 180))
(downmordent
 (script-stencil feta "downmordent" . "downmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(downprall
 (script-stencil feta "downprall" . "downprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(espressivo
 (avoid-slur . around)
 (padding . 0.2)
 (script-stencil feta "espr" . "espr")
 (side-axis . 1)
 (side-relative-direction . -1))
(fermata
 (script-stencil feta "dfermata" . "ufermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(flageolet
 (script-stencil feta "flageolet" . "flageolet")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1)
 (side-axis . 1)
 (script-priority . 50))
(halfopen
 (avoid-slur . outside)
 (padding . 0.2)
```

```
 (script-stencil feta "halfopen" . "halfopen")
 (side-axis . 1)
 (direction . 1))
(halfopenvertical
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil feta "halfopenvertical" . "halfopenvertical")
 (side-axis . 1)
 (direction . 1))
(haydnturn
 (script-stencil feta "haydnturn" . "haydnturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (side-axis . 1)
 (direction . 1))
(heel (script-stencil feta "upedalheel" . "upedalheel")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . 1))
(heelcircle
 (script-stencil feta "pedalheelcircle" . "pedalheelcircle")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(henzelongfermata
 (script-stencil
  feta
  "dhenzelongfermata"
  .
  "uhenzelongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(henzeshortfermata
 (script-stencil
  feta
  "dhenzeshortfermata"
  .
  "uhenzeshortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(ictus (script-stencil feta "ictus" . "ictus")
     (side-relative-direction . -1)
```

```
     (quantize-position . #t)
     (avoid-slur . ignore)
     (padding . 0.2)
     (script-priority . -100)
     (side-axis . 1)
     (direction . -1))
(lheel (script-stencil feta "upedalheel" . "upedalheel")
     (padding . 0.2)
     (avoid-slur . around)
     (side-axis . 1)
     (direction . -1))
(lineprall
 (script-stencil feta "lineprall" . "lineprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(longfermata
 (script-stencil feta "dlongfermata" . "ulongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(ltoe (script-stencil feta "upedaltoe" . "upedaltoe")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . -1))
(marcato
 (script-stencil feta "dmarcato" . "umarcato")
 (padding . 0.2)
 (avoid-slur . inside)
 (quantize-position . #t)
 (side-axis . 1)
 (side-relative-direction . -1))
(mordent
 (script-stencil feta "mordent" . "mordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(open (avoid-slur . outside)
    (padding . 0.2)
    (script-stencil feta "open" . "open")
    (side-axis . 1)
    (direction . 1))
(outsidecomma
 (avoid-slur . around)
 (direction . 1)
 (padding . 0.2)
```

```
 (side-axis . 1)
 (script-stencil feta "lcomma" . "rcomma"))
(portato
 (script-stencil feta "uportato" . "dportato")
 (avoid-slur . around)
 (padding . 0.45)
 (side-axis . 1)
 (side-relative-direction . -1))
(prall (script-stencil feta "prall" . "prall")
     (padding . 0.2)
     (avoid-slur . around)
     (side-axis . 1)
     (direction . 1))
(pralldown
 (script-stencil feta "pralldown" . "pralldown")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(prallmordent
 (script-stencil feta "prallmordent" . "prallmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(prallprall
 (script-stencil feta "prallprall" . "prallprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(prallup
 (script-stencil feta "prallup" . "prallup")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(reverseturn
 (script-stencil feta "reverseturn" . "reverseturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (side-axis . 1)
 (direction . 1))
(rheel (script-stencil feta "dpedalheel" . "dpedalheel")
     (padding . 0.2)
     (avoid-slur . around)
     (side-axis . 1)
     (direction . 1))
(rtoe (script-stencil feta "dpedaltoe" . "dpedaltoe")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
```

```
    (direction . 1))
(segno (script-stencil feta "segno" . "segno")
     (padding . 0.2)
     (avoid-slur . outside)
     (side-axis . 1)
     (direction . 1))
(semicirculus
 (script-stencil feta "dsemicirculus" . "dsemicirculus")
 (side-relative-direction . -1)
 (quantize-position . #t)
 (avoid-slur . ignore)
 (padding . 0.2)
 (script-priority . -100)
 (side-axis . 1)
 (direction . 1))
(shortfermata
 (script-stencil feta "dshortfermata" . "ushortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(signumcongruentiae
 (script-stencil
  feta
  "dsignumcongruentiae"
  .
  "usignumcongruentiae")
 (padding . 0.2)
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(slashturn
 (script-stencil feta "slashturn" . "slashturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (side-axis . 1)
 (direction . 1))
(snappizzicato
 (script-stencil feta "snappizzicato" . "snappizzicato")
 (padding . 0.2)
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(staccatissimo
 (avoid-slur . inside)
 (quantize-position . #t)
 (script-stencil feta "dstaccatissimo" . "ustaccatissimo")
 (padding . 0.2)
 (skyline-horizontal-padding . 0.1)
 (side-axis . 1)
```

```
 (side-relative-direction . -1)
 (toward-stem-shift . 1.0)
 (toward-stem-shift-in-column . 0.0))
(staccato
 (script-stencil feta "staccato" . "staccato")
 (side-axis . 1)
 (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)
 (side-axis . 1)
 (direction . 1))
(tenuto
 (script-stencil feta "tenuto" . "tenuto")
 (quantize-position . #t)
 (avoid-slur . inside)
 (padding . 0.2)
 (script-priority . -50)
 (side-axis . 1)
 (side-relative-direction . -1))
(toe (script-stencil feta "dpedaltoe" . "dpedaltoe")
   (padding . 0.2)
   (avoid-slur . around)
   (side-axis . 1)
   (direction . 1))
(trill (script-stencil feta "trill" . "trill")
    (direction . 1)
    (padding . 0.2)
    (avoid-slur . outside)
    (side-axis . 1)
    (script-priority . 150))
(turn (script-stencil feta "turn" . "turn")
    (avoid-slur . inside)
    (padding . 0.2)
    (side-axis . 1)
    (direction . 1))
(upbow (script-stencil feta "dupbow" . "uupbow")
    (avoid-slur . around)
    (padding . 0.2)
    (direction . 1)
    (side-axis . 1)
    (script-priority . 180))
(upmordent
 (script-stencil feta "upmordent" . "upmordent")
```

```
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(upprall
 (script-stencil feta "upprall" . "upprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(varcoda
 (script-stencil feta "varcoda" . "varcoda")
 (padding . 0.2)
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(varcomma
 (script-stencil feta "lvarcomma" . "rvarcomma")
 (quantize-position . #t)
 (padding . 0.2)
 (avoid-slur . ignore)
 (side-axis . 1)
 (direction . 1))
(varheel
 (script-stencil feta "dpedalheel" . "dpedalheel")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(vartoe
 (script-stencil feta "upedaltoe" . "upedaltoe")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(verylongfermata
 (script-stencil feta "dverylongfermata" . "uverylongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(veryshortfermata
 (script-stencil
  feta
  "dveryshortfermata"
  .
  "uveryshortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
```

```
(script-priority . 175)
(side-axis . 1)
(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 `submeasureBarsEnabled` to `#f`.
- Set context property `submeasureBarType` to `"!"`.
- 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 `tempoCountPrecision` to `1/4`.
- Set context property `tieWaitForNote` to `#f`.
- Set context property `timeSignatureSettings` to:

```
'(((2 . 2) (beamExceptions (end (1/32 8 8 8 8))))
  ((2 . 8) (beamExceptions (end (1/8 2))))
  ((3 . 2) (beamExceptions (end (1/32 8 8 8 8 8 8))))
  ((3 . 4) (beamExceptions (end (1/8 6) (1/12 3 3 3))))
  ((3 . 8) (beamExceptions (end (1/8 3))))
  ((4 . 2) (beamExceptions (end (1/16 4 4 4 4 4 4 4 4))))
  ((4 . 4) (beamExceptions (end (1/8 4 4) (1/12 3 3 3 3))))
  ((4 . 8) (beatStructure 2 2))
  ((6 . 4) (beamExceptions (end (1/16 4 4 4 4 4 4))))
  ((9 . 4) (beamExceptions (end (1/32 8 8 8 8 8 8 8 8))))
  ((12 . 4)
   (beamExceptions (end (1/32 8 8 8 8 8 8 8 8 8 8 8 8))))
```

```
((5 . 8) (beatStructure 3 2))
((8 . 8) (beatStructure 3 3 2)))
```

- Set context property `timeSignature` to:

  `'(4 . 4)`
- 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 314).

Context `Score` can contain `ChoirStaff` (page 69), `ChordNames` (page 100), `Devnull` (page 113), `DrumStaff` (page 113), `Dynamics` (page 133), `FiguredBass` (page 138), `FretBoards` (page 140), `GrandStaff` (page 142), `GregorianTranscriptionLyrics` (page 144), `GregorianTranscriptionStaff` (page 147), `KievanStaff` (page 198), `Lyrics` (page 223), `MensuralStaff` (page 225), `NoteNames` (page 250), `OneStaff` (page 254), `PetrucciStaff` (page 255), `PianoStaff` (page 281), `RhythmicStaff` (page 283), `Staff` (page 314), `StaffGroup` (page 327), `TabStaff` (page 370), `VaticanaLyrics` (page 393), and `VaticanaStaff` (page 419).

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

`Apply_output_engraver` (page 457)
: Apply a procedure to any grob acknowledged.

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

`Bar_number_engraver` (page 461)
: 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 `Staff_collecting_engraver` (page 505). 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 first volta number for the current `\alternative` element. Not set outside of alternatives.

  `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)
The current point within the measure.

`stavesFound` (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): `BarNumber` (page 551), and `CenteredBarNumber` (page 569).

`Beam_collision_engraver` (page 463)
Help beams avoid colliding with notes and clefs in other voices.

`Break_align_engraver` (page 465)
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 563), `BreakAlignment` (page 564), and `LeftEdge` (page 643).

`Centered_bar_number_align_engraver` (page 467)
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 570).

`Concurrent_hairpin_engraver` (page 470)
Collect concurrent hairpins.

`Footnote_engraver` (page 478)
Create footnote texts.

This engraver creates the following layout object(s): `Footnote` (page 618).

`Grace_spacing_engraver` (page 481)
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 623).

`Jump_engraver` (page 484)
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 505), also needs to be there so that marks appear at the intended Y location.

Music types accepted: `ad-hoc-jump-event` (page 51), `dal-segno-event` (page 53), and `fine-event` (page 53),

Properties (read)

`codaMarkCount` (non-negative, exact integer)
Updated at the end of each time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 633).

`Mark_engraver` (page 488)
: 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 505), 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 489). 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 583), RehearsalMark (page 685), SectionLabel (page 693), and SegnoMark (page 695).

Mark_tracking_translator (page 489)
: This translator chooses which marks Mark_engraver should engrave.

Music types accepted: ad-hoc-mark-event (page 51), coda-mark-event (page 52), rehearsal-mark-event (page 58), section-label-event (page 58), and segno-mark-event (page 59),

Properties (read)

codaMarkCount (non-negative, exact integer)
: Updated at the end of each time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 491)
: 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 Staff_collecting_engraver (page 505).

Music types accepted: tempo-change-event (page 61),

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 658).

Paper_column_engraver (page 496)
: 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 52), and label-event (page 54),

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 667), and PaperColumn (page 677).

Parenthesis_engraver (page 496)
: Parenthesize objects whose parenthesize property is #t.

This engraver creates the following layout object(s): Parentheses (page 678).

Repeat_acknowledge_engraver (page 499)
: This engraver augments repeatCommands with start-repeat and end-repeat entries based on received events. This is internal behavior that allows simplifying other engravers that must support both \repeat volta and manual repeats.

This engraver also resets repeatCommands at the beginning of each time step. This is user-facing behavior: it allows setting a value for the current time step simply with \set rather than requiring \once \set.

Music types accepted: volta-repeat-end-event (page 62), and volta-repeat-start-event (page 62),

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 502)
: 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 587), and ControlPolygon (page 588).

Spacing_engraver (page 503)
: Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.

Music types accepted: spacing-section-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.).

proportionalNotationDuration (non-negative exact rational or +inf.0)
Global override for shortest-playing duration. This is used for switching on proportional notation.

This engraver creates the following layout object(s): SpacingSpanner (page 705).

Spanner_tracking_engraver (page 504)
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 505)
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 506)
This engraver ensures that stanza numbers are neatly aligned.

System_start_delimiter_engraver (page 507)
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 725), SystemStartBrace (page 726), SystemStartBracket (page 727), and SystemStartSquare (page 728).

Text_mark_engraver (page 509)
Engraves arbitrary textual marks.

Music types accepted: text-mark-event (page 61),

Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): TextMark (page 731).

`Timing_translator` (page 511)
: 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 51), `bar-check-event` (page 51), `bar-event` (page 51), `fine-event` (page 53), `partial-event` (page 57), and `polymetric-time-signature-event` (page 58),

  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.

  `beatBase` (positive exact rational or +inf.0)
  : The musical length corresponding to one unit of `beatStructure`.

  `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 exact rational or +inf.0)
  : The musical length of the current measure.

  `measurePosition` (moment)
  : The current point within the measure.

  `timeSignature` (time signature)
  : A time-signature specification. See the `\time` command.

  Properties (write)

  `alternativeNumber` (non-negative, exact integer)
  : When set, the first volta number for the current `\alternative` element. Not set outside of alternatives.

  `beatBase` (positive exact rational or +inf.0)
  : The musical length corresponding to one unit of `beatStructure`.

  `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 exact rational or +inf.0)
  : The musical length of the current measure.

  `measurePosition` (moment)
  : The current point within the measure.

  `measureStartNow` (boolean)
  : True at the beginning of a measure.

`timeSignature` (time signature)
A time-signature specification. See the `\time` command.

`Tweak_engraver` (page 513)
Read the `tweaks` property from the originating event, and set properties.

`Vertical_align_engraver` (page 513)
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 710), and `VerticalAlignment` (page 753).

`Volta_engraver` (page 513)
Make volta brackets.

Music types accepted: `dal-segno-event` (page 53), `fine-event` (page 53), and `volta-span-event` (page 62),

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.

This engraver creates the following layout object(s): `VoltaBracket` (page 757), and `VoltaBracketSpanner` (page 758).

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 533), AccidentalCautionary (page 534), AccidentalPlacement (page 535), AccidentalSuggestion (page 536), BarLine (page 547), BassFigure (page 553), BassFigureAlignment (page 553), BassFigureAlignmentPositioning (page 554), BassFigureBracket (page 555), BassFigureContinuation (page 556), BassFigureLine (page 556), BreathingSign (page 565), CaesuraScript (page 568), Clef (page 577), ClefModifier (page 580), CueClef (page 589), CueEndClef (page 592), DotColumn (page 600), FingeringColumn (page 617), InstrumentName (page 630), KeyCancellation (page 634), KeySignature (page 637), LedgerLineSpanner (page 643), NoteCollision (page 668), OptionalMaterialBracket (page 673), OttavaBracket (page 676), PianoPedalBracket (page 684), RestCollision (page 690), ScriptColumn (page 692), ScriptRow (page 693), SostenutoPedal (page 702), SostenutoPedalLineSpanner (page 704), StaffEllipsis (page 708), StaffHighlight (page 711), StaffSpacing (page 712), StaffSymbol (page 713), SustainPedal (page 722), SustainPedalLineSpanner (page 723), TimeSignature (page 739), UnaCordaPedal (page 750), UnaCordaPedalLineSpanner (page 752), and VerticalAxisGroup (page 754).

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 444).

Context Staff can contain CueVoice (page 102), NullVoice (page 252), and Voice (page 444).

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

Accidental_engraver (page 455)
: 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 533), `AccidentalCautionary` (page 534), `AccidentalPlacement` (page 535), and `AccidentalSuggestion` (page 536).

`Alteration_glyph_engraver` (page 456)
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.

`Apply_output_engraver` (page 457)
Apply a procedure to any grob acknowledged.

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

`Axis_group_engraver` (page 458)
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 754).

`Bar_engraver` (page 459)
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 51), `caesura-event` (page 52), `coda-mark-event` (page 52), `dal-segno-event` (page 53), `fine-event` (page 53), `section-event` (page 58), and `segno-mark-event` (page 59),

Properties (read)

`caesuraType` (list)
An alist

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

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

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

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

`caesuraTypeTransform` (procedure)
: An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

  The first argument is the context.

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

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

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

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

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

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

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
: Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`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 time step.

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 547).

Caesura_engraver (page 466)
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 52),

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 565), and `CaesuraScript` (page 568).

`Clef_engraver` (page 468)
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 577), and `ClefModifier` (page 580).

`Collision_engraver` (page 469)
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 668).

`Cue_clef_engraver` (page 471)
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 580), `CueClef` (page 589), and `CueEndClef` (page 592).

`Dot_column_engraver` (page 473)
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 600).

`Figured_bass_engraver` (page 477)
Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 51), and `rest-event` (page 58),

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 553), BassFigureAlignment (page 553), BassFigureBracket (page 555), BassFigureContinuation (page 556), and BassFigureLine (page 556).

Figured_bass_position_engraver (page 477)
Position figured bass alignments over notes.

This engraver creates the following layout object(s): BassFigureAlignmentPositioning (page 554).

Fingering_column_engraver (page 478)
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 617).

Font_size_engraver (page 478)
Put fontSize into font-size grob property.

Properties (read)

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

Grob_pq_engraver (page 482)
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.).

Horizontal_script_engraver (page 482)
Aligns Script horizontally

Instrument_name_engraver (page 483)
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 630).

Key_engraver (page 485)
: Engrave a key signature.

Music types accepted: key-change-event (page 54),

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 634), and `KeySignature` (page 637).

`Ledger_line_engraver` (page 486)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 643).

`Merge_mmrest_numbers_engraver` (page 491)
: 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 493)
: 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 692).

`Optional_material_bracket_engraver` (page 495)
: Notate in-staff brackets for optional material.

Music types accepted: `optional-material-event` (page 57),

This engraver creates the following layout object(s): `OptionalMaterialBracket` (page 673).

`Ottava_spanner_engraver` (page 495)
: Create a text spanner when the ottavation property changes.

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

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 676).

`Piano_pedal_align_engraver` (page 498)
: 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 704), SustainPedalLineSpanner (page 723), and UnaCordaPedalLineSpanner (page 752).

Piano_pedal_engraver (page 498)
Engrave piano pedal symbols and brackets.

Music types accepted: sostenuto-event (page 59), sustain-event (page 61), and una-corda-event (page 62),

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 684), SostenutoPedal (page 702), SustainPedal (page 722), and UnaCordaPedal (page 750).

Pure_from_neighbor_engraver (page 499)
Coordinates items that get their pure heights from their neighbors.

Rest_collision_engraver (page 500)
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 690).

Script_row_engraver (page 501)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 693).

Separating_line_group_engraver (page 502)
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 712).

Skip_typesetting_engraver (page 502)
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 708).

Staff_collecting_engraver (page 505)
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 505)
Highlights music passages.

Music types accepted: staff-highlight-event (page 59),

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 711).

Staff_symbol_engraver (page 506)
Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): StaffSymbol (page 713).

Time_signature_engraver (page 510)
Create a TimeSignature (page 739), whenever timeSignature changes.

Music types accepted: polymetric-time-signature-event (page 58), and reference-time-signature-event (page 58),

Properties (read)

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

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

timeSignature (time signature)
A time-signature specification. See the \time command.

This engraver creates the following layout object(s): TimeSignature (page 739).

2.1.33 StaffGroup

Connect staves vertically by adding a bracket on the left side. The bar lines of the contained staves are connected vertically, too.

This context creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), ChordSlur (page 574), InstrumentName (page 630), SpanBar (page 706), SpanBarStub (page 707), StaffGrouper (page 710), SystemStartBar (page 725), SystemStartBrace (page 726), SystemStartBracket (page 727), SystemStartSquare (page 728), and VerticalAlignment (page 753).

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 609), to #f.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Staff (page 314).

Context StaffGroup can contain ChoirStaff (page 69), ChordNames (page 100), Devnull (page 113), DrumStaff (page 113), Dynamics (page 133), FiguredBass (page 138), FretBoards (page 140), GrandStaff (page 142), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), NoteNames (page 250), OneStaff (page 254), PetrucciStaff (page 255), PianoStaff (page 281), RhythmicStaff (page 283), Staff (page 314), StaffGroup (page 327), TabStaff (page 370), VaticanaLyrics (page 393), and VaticanaStaff (page 419).

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

Apply_output_engraver (page 457)
Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 51),

Instrument_name_engraver (page 483)
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 630).

`Span_arpeggio_engraver` (page 504)
Make arpeggios, non-arpeggiato brackets, and vertical slurs spanning multiple staves.

Properties (read)

`connectArpeggios` (boolean)
If set, connect arpeggios across piano staff.

`connectChordBrackets` (boolean)
If set, connect chord brackets across piano staff.

`connectChordSlurs` (boolean)
If set, connect chord slurs across piano staff.

This engraver creates the following layout object(s): `Arpeggio` (page 544), `ChordBracket` (page 572), and `ChordSlur` (page 574).

`Span_bar_engraver` (page 504)
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 706).

`Span_bar_stub_engraver` (page 504)
Make stubs for span bars in all contexts that the span bars cross.

This engraver creates the following layout object(s): `SpanBarStub` (page 707).

`System_start_delimiter_engraver` (page 507)
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 725), `SystemStartBrace` (page 726), `SystemStartBracket` (page 727), and `SystemStartSquare` (page 728).

`Vertical_align_engraver` (page 513)
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 710), and VerticalAlignment (page 753).

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 289), and Timing (page 289).

This context creates the following layout object(s): BarNumber (page 551), BreakAlignGroup (page 563), BreakAlignment (page 564), CenteredBarNumber (page 569), CenteredBarNumberLineSpanner (page 570), CodaMark (page 583), ControlPoint (page 587), ControlPolygon (page 588), Footnote (page 618), GraceSpacing (page 623), JumpScript (page 633), LeftEdge (page 643), MetronomeMark (page 658), NonMusicalPaperColumn (page 667), PaperColumn (page 677), Parentheses (page 678), RehearsalMark (page 685), SectionLabel (page 693), SegnoMark (page 695), SpacingSpanner (page 705), StaffGrouper (page 710), SystemStartBar (page 725), SystemStartBrace (page 726), SystemStartBracket (page 727), SystemStartSquare (page 728), TextMark (page 731), VerticalAlignment (page 753), VoltaBracket (page 757), and VoltaBracketSpanner (page 758).

This context sets the following properties:

- Set context property additionalPitchPrefix to "add".
- 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 #<program>)
- Set context property autoBeamCheck to default-auto-beam-check.
- Set context property autoBeaming to #t.
- Set context property autoCautionaries to '().
- 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 #<program>
      "scripts.raltcomma"))
 (caesura
  (text #<program>
      "scripts.caesura.straight"))
 (chantdoublebar
  (extra-spacing-width -1.0 . 0.0)
  (stencil . #<program>)
  (Y-offset . 0.0))
```

```
(chantfullbar
 (extra-spacing-width -1.0 . 0.0)
 (stencil . #<program>)
 (Y-offset . 0.0))
(chanthalfbar
 (extra-spacing-height . #<program>)
 (extra-spacing-width -1.0 . 0.0)
 (stencil . #<program>)
 (Y-offset . 0.0))
(chantquarterbar
 (extra-spacing-height . #<program>)
 (extra-spacing-width -1.0 . 0.0)
 (stencil . #<program>))
(comma (text #<program>
        "scripts.rcomma"))
(curvedcaesura
 (text #<program>
     "scripts.caesura.curved"))
(outsidecomma
 (outside-staff-priority . 40)
 (text #<program> "scripts.rcomma"))
(spacer (text #<program>))
(tickmark
 (outside-staff-priority . 40)
 (text #<program>
     "scripts.tickmark"))
(upbow (outside-staff-priority . 40)
     (text #<program>
         "scripts.uupbow"))
(varcomma
 (text #<program>
     "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' >)
  #<program>
  ("+"))
 ((#<Pitch ees' > #<Pitch ges' >)
  #<program>
  ((#<program>
    ((#<program> 2 "°")))))
 ((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >)
  #<program>
  ((#<program> "ø")))
 ((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >)
  #<program>
  ((#<program>
    ((#<program> 2 "°")))
```

```
 (#<program> "7")))
((#<Pitch e' >
 #<Pitch g' >
 #<Pitch bes' >
 #<Pitch des'' >
 #<Pitch ees'' >
 #<Pitch fis'' >
 #<Pitch aes'' >)
 #<program>
 ((#<program> "alt")))
((#<Pitch g' >)
 #<program>
 ((#<program> "5")))
((#<Pitch g' > #<Pitch c'' >)
 #<program>
 ((#<program> "5"))))
```

- Set context property `chordNameFunction` to `ignatzek-chord-names`.
- Set context property `chordNameLowercaseMinor` to `#f`.
- Set context property `chordNameSeparator` to:
  `'(#<program> 0.5)`
- Set context property `chordNoteNamer` to `#<program>`.
- Set context property `chordPrefixSpacer` to `0`.
- Set context property `chordRootNamer` to `#<program>`.
- 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 `#<program>`.
- 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 `deprecatedBarCheckSynchronize` to `#f`.
- 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:

```
'(#<program>
 ((#<program>
  -3
  (#<program> #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:
  `'("Sost. Ped." "*Sost. Ped." "*")`
- Set context property `pedalSostenutoStyle` to `'mixed`.
- Set context property `pedalSustainStrings` to:
  `'("Ped." "*Ped." "*")`
- Set context property `pedalSustainStyle` to `'text`.
- Set context property `pedalUnaCordaStrings` to:
  `'("una corda" "" "tre corde")`
- Set context property `pedalUnaCordaStyle` to `'text`.
- Set context property `predefinedDiagramTable` to `#f`.
- Set context property `printAccidentalNames` to `#t`.
- Set context property `printKeyCancellation` to `#t`.
- Set context property `printOctaveNames` to `#f`.
- Set context property `printPartCombineTexts` to `#t`.
- Set context property `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 `#<program>`.
- 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-axis . 1)
  (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)
 (side-axis . 1)
 (direction . 1))
(altcomma
 (script-stencil feta "laltcomma" . "raltcomma")
 (quantize-position . #t)
 (padding . 0.2)
 (avoid-slur . ignore)
 (side-axis . 1)
 (direction . 1))
(bachschleifer
 (script-stencil feta "bachschleifer" . "bachschleifer")
 (no-ledgers . #f)
 (padding . 0.8)
 (length-fraction . 1.5)
 (avoid-slur . around)
 (side-axis . 0)
 (direction . -1)
 (staff-position . #<program>))
(circulus
 (script-stencil feta "circulus" . "circulus")
 (side-relative-direction . -1)
 (avoid-slur . ignore)
 (padding . 0.2)
 (quantize-position . #t)
 (script-priority . -100)
 (side-axis . 1)
 (direction . 1))
(coda (script-stencil feta "coda" . "coda")
    (padding . 0.2)
    (avoid-slur . outside)
    (side-axis . 1)
    (direction . 1))
(comma (script-stencil feta "lcomma" . "rcomma")
     (quantize-position . #t)
     (padding . 0.2)
     (avoid-slur . ignore)
     (side-axis . 1)
     (direction . 1))
(downbow
 (script-stencil feta "ddownbow" . "udownbow")
 (padding . 0.2)
 (skyline-horizontal-padding . 0.2)
 (avoid-slur . around)
 (direction . 1)
 (side-axis . 1)
 (script-priority . 180))
(downmordent
```

```
 (script-stencil feta "downmordent" . "downmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(downprall
 (script-stencil feta "downprall" . "downprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(espressivo
 (avoid-slur . around)
 (padding . 0.2)
 (script-stencil feta "espr" . "espr")
 (side-axis . 1)
 (side-relative-direction . -1))
(fermata
 (script-stencil feta "dfermata" . "ufermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(flageolet
 (script-stencil feta "flageolet" . "flageolet")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1)
 (side-axis . 1)
 (script-priority . 50))
(halfopen
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil feta "halfopen" . "halfopen")
 (side-axis . 1)
 (direction . 1))
(halfopenvertical
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil feta "halfopenvertical" . "halfopenvertical")
 (side-axis . 1)
 (direction . 1))
(haydnturn
 (script-stencil feta "haydnturn" . "haydnturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (side-axis . 1)
 (direction . 1))
(heel (script-stencil feta "upedalheel" . "upedalheel")
    (padding . 0.2)
```

```
    (avoid-slur . around)
    (side-axis . 1)
    (direction . 1))
(heelcircle
 (script-stencil feta "pedalheelcircle" . "pedalheelcircle")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(henzelongfermata
 (script-stencil
  feta
  "dhenzelongfermata"
  .
  "uhenzelongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(henzeshortfermata
 (script-stencil
  feta
  "dhenzeshortfermata"
  .
  "uhenzeshortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(ictus (script-stencil feta "ictus" . "ictus")
    (side-relative-direction . -1)
    (quantize-position . #t)
    (avoid-slur . ignore)
    (padding . 0.2)
    (script-priority . -100)
    (side-axis . 1)
    (direction . -1))
(lheel (script-stencil feta "upedalheel" . "upedalheel")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . -1))
(lineprall
 (script-stencil feta "lineprall" . "lineprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
```

```
(longfermata
 (script-stencil feta "dlongfermata" . "ulongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(ltoe (script-stencil feta "upedaltoe" . "upedaltoe")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . -1))
(marcato
 (script-stencil feta "dmarcato" . "umarcato")
 (padding . 0.2)
 (avoid-slur . inside)
 (quantize-position . #t)
 (side-axis . 1)
 (side-relative-direction . -1))
(mordent
 (script-stencil feta "mordent" . "mordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(open (avoid-slur . outside)
    (padding . 0.2)
    (script-stencil feta "open" . "open")
    (side-axis . 1)
    (direction . 1))
(outsidecomma
 (avoid-slur . around)
 (direction . 1)
 (padding . 0.2)
 (side-axis . 1)
 (script-stencil feta "lcomma" . "rcomma"))
(portato
 (script-stencil feta "uportato" . "dportato")
 (avoid-slur . around)
 (padding . 0.45)
 (side-axis . 1)
 (side-relative-direction . -1))
(prall (script-stencil feta "prall" . "prall")
     (padding . 0.2)
     (avoid-slur . around)
     (side-axis . 1)
     (direction . 1))
(pralldown
 (script-stencil feta "pralldown" . "pralldown")
 (padding . 0.2)
 (avoid-slur . around)
```

```
 (side-axis . 1)
 (direction . 1))
(prallmordent
 (script-stencil feta "prallmordent" . "prallmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(prallprall
 (script-stencil feta "prallprall" . "prallprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(prallup
 (script-stencil feta "prallup" . "prallup")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(reverseturn
 (script-stencil feta "reverseturn" . "reverseturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (side-axis . 1)
 (direction . 1))
(rheel (script-stencil feta "dpedalheel" . "dpedalheel")
     (padding . 0.2)
     (avoid-slur . around)
     (side-axis . 1)
     (direction . 1))
(rtoe (script-stencil feta "dpedaltoe" . "dpedaltoe")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . 1))
(segno (script-stencil feta "segno" . "segno")
     (padding . 0.2)
     (avoid-slur . outside)
     (side-axis . 1)
     (direction . 1))
(semicirculus
 (script-stencil feta "dsemicirculus" . "dsemicirculus")
 (side-relative-direction . -1)
 (quantize-position . #t)
 (avoid-slur . ignore)
 (padding . 0.2)
 (script-priority . -100)
 (side-axis . 1)
 (direction . 1))
(shortfermata
 (script-stencil feta "dshortfermata" . "ushortfermata")
```

```
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(signumcongruentiae
 (script-stencil
  feta
  "dsignumcongruentiae"
  .
  "usignumcongruentiae")
 (padding . 0.2)
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(slashturn
 (script-stencil feta "slashturn" . "slashturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (side-axis . 1)
 (direction . 1))
(snappizzicato
 (script-stencil feta "snappizzicato" . "snappizzicato")
 (padding . 0.2)
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(staccatissimo
 (avoid-slur . inside)
 (quantize-position . #t)
 (script-stencil feta "dstaccatissimo" . "ustaccatissimo")
 (padding . 0.2)
 (skyline-horizontal-padding . 0.1)
 (side-axis . 1)
 (side-relative-direction . -1)
 (toward-stem-shift . 1.0)
 (toward-stem-shift-in-column . 0.0))
(staccato
 (script-stencil feta "staccato" . "staccato")
 (side-axis . 1)
 (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)
 (side-axis . 1)
 (direction . 1))
(tenuto
 (script-stencil feta "tenuto" . "tenuto")
 (quantize-position . #t)
 (avoid-slur . inside)
 (padding . 0.2)
 (script-priority . -50)
 (side-axis . 1)
 (side-relative-direction . -1))
(toe (script-stencil feta "dpedaltoe" . "dpedaltoe")
   (padding . 0.2)
   (avoid-slur . around)
   (side-axis . 1)
   (direction . 1))
(trill (script-stencil feta "trill" . "trill")
    (direction . 1)
    (padding . 0.2)
    (avoid-slur . outside)
    (side-axis . 1)
    (script-priority . 150))
(turn (script-stencil feta "turn" . "turn")
    (avoid-slur . inside)
    (padding . 0.2)
    (side-axis . 1)
    (direction . 1))
(upbow (script-stencil feta "dupbow" . "uupbow")
    (avoid-slur . around)
    (padding . 0.2)
    (direction . 1)
    (side-axis . 1)
    (script-priority . 180))
(upmordent
 (script-stencil feta "upmordent" . "upmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(upprall
 (script-stencil feta "upprall" . "upprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(varcoda
 (script-stencil feta "varcoda" . "varcoda")
 (padding . 0.2)
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(varcomma
```

```
 (script-stencil feta "lvarcomma" . "rvarcomma")
 (quantize-position . #t)
 (padding . 0.2)
 (avoid-slur . ignore)
 (side-axis . 1)
 (direction . 1))
(varheel
 (script-stencil feta "dpedalheel" . "dpedalheel")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(vartoe
 (script-stencil feta "upedaltoe" . "upedaltoe")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(verylongfermata
 (script-stencil feta "dverylongfermata" . "uverylongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(veryshortfermata
 (script-stencil
  feta
  "dveryshortfermata"
  .
  "uveryshortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (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 submeasureBarsEnabled to #f.
- Set context property submeasureBarType to "!".
- 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 tempoCountPrecision to 1/4.
- Set context property tieWaitForNote to #f.
- Set context property timeSignatureSettings to:

```
'(((2 . 2) (beamExceptions (end (1/32 8 8 8 8))))
 ((2 . 8) (beamExceptions (end (1/8 2))))
 ((3 . 2) (beamExceptions (end (1/32 8 8 8 8 8 8))))
 ((3 . 4) (beamExceptions (end (1/8 6) (1/12 3 3 3))))
 ((3 . 8) (beamExceptions (end (1/8 3))))
 ((4 . 2) (beamExceptions (end (1/16 4 4 4 4 4 4 4 4))))
 ((4 . 4) (beamExceptions (end (1/8 4 4) (1/12 3 3 3 3))))
 ((4 . 8) (beatStructure 2 2))
 ((6 . 4) (beamExceptions (end (1/16 4 4 4 4 4 4))))
 ((9 . 4) (beamExceptions (end (1/32 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))))
 ((5 . 8) (beatStructure 3 2))
 ((8 . 8) (beatStructure 3 3 2)))
```

- Set context property timeSignature to:

```
'(4 . 4)
```

- 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 common-shortest-duration in SpacingSpanner (page 705), 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 353).

Context StandaloneRhythmScore can contain ChoirStaff (page 69), ChordNames (page 100), Devnull (page 113), DrumStaff (page 113), Dynamics (page 133), FiguredBass

(page 138), FretBoards (page 140), GrandStaff (page 142), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), NoteNames (page 250), OneStaff (page 254), PetrucciStaff (page 255), PianoStaff (page 281), RhythmicStaff (page 283), Staff (page 314), StaffGroup (page 327), StandaloneRhythmStaff (page 353), TabStaff (page 370), VaticanaLyrics (page 393), and VaticanaStaff (page 419).

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

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Bar_number_engraver (page 461)
: 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 Staff_collecting_engraver (page 505). 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 first volta number for the current \alternative element. Not set outside of alternatives.

  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)
The current point within the measure.

`stavesFound` (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): `BarNumber` (page 551), and `CenteredBarNumber` (page 569).

`Beam_collision_engraver` (page 463)
Help beams avoid colliding with notes and clefs in other voices.

`Break_align_engraver` (page 465)
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 563), `BreakAlignment` (page 564), and `LeftEdge` (page 643).

`Centered_bar_number_align_engraver` (page 467)
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 570).

`Concurrent_hairpin_engraver` (page 470)
Collect concurrent hairpins.

`Footnote_engraver` (page 478)
Create footnote texts.

This engraver creates the following layout object(s): `Footnote` (page 618).

`Grace_spacing_engraver` (page 481)
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 623).

`Jump_engraver` (page 484)
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 505), also needs to be there so that marks appear at the intended Y location.

Music types accepted: `ad-hoc-jump-event` (page 51), `dal-segno-event` (page 53), and `fine-event` (page 53),

Properties (read)

`codaMarkCount` (non-negative, exact integer)
Updated at the end of each time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 633).

`Mark_engraver` (page 488)
: 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 505), 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 489). 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 583), RehearsalMark (page 685), SectionLabel (page 693), and SegnoMark (page 695).

Mark_tracking_translator (page 489)
This translator chooses which marks Mark_engraver should engrave.

Music types accepted: ad-hoc-mark-event (page 51), coda-mark-event (page 52), rehearsal-mark-event (page 58), section-label-event (page 58), and segno-mark-event (page 59),

Properties (read)

codaMarkCount (non-negative, exact integer)
Updated at the end of each time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 491)
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 Staff_collecting_engraver (page 505).

Music types accepted: tempo-change-event (page 61),

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 658).

Paper_column_engraver (page 496)
: 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 52), and label-event (page 54),

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 667), and PaperColumn (page 677).

Parenthesis_engraver (page 496)
: Parenthesize objects whose parenthesize property is #t.

This engraver creates the following layout object(s): Parentheses (page 678).

Repeat_acknowledge_engraver (page 499)
: This engraver augments repeatCommands with start-repeat and end-repeat entries based on received events. This is internal behavior that allows simplifying other engravers that must support both \repeat volta and manual repeats.

This engraver also resets repeatCommands at the beginning of each time step. This is user-facing behavior: it allows setting a value for the current time step simply with \set rather than requiring \once \set.

Music types accepted: volta-repeat-end-event (page 62), and volta-repeat-start-event (page 62),

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 502)
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 587), and ControlPolygon (page 588).

Spacing_engraver (page 503)
Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.

Music types accepted: spacing-section-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.).

proportionalNotationDuration (non-negative exact rational or +inf.0)
Global override for shortest-playing duration. This is used for switching on proportional notation.

This engraver creates the following layout object(s): SpacingSpanner (page 705).

Spanner_tracking_engraver (page 504)
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 505)
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 506)
This engraver ensures that stanza numbers are neatly aligned.

System_start_delimiter_engraver (page 507)
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 725), SystemStartBrace (page 726), SystemStartBracket (page 727), and SystemStartSquare (page 728).

Text_mark_engraver (page 509)
Engraves arbitrary textual marks.

Music types accepted: text-mark-event (page 61),

Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): TextMark (page 731).

Timing_translator (page 511)
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 51), bar-check-event (page 51), bar-event (page 51), fine-event (page 53), partial-event (page 57), and polymetric-time-signature-event (page 58),

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.

beatBase (positive exact rational or +inf.0)
The musical length corresponding to one unit of beatStructure.

`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 exact rational or +inf.0)
: The musical length of the current measure.

`measurePosition` (moment)
: The current point within the measure.

`timeSignature` (time signature)
: A time-signature specification. See the `\time` command.

Properties (write)

`alternativeNumber` (non-negative, exact integer)
: When set, the first volta number for the current `\alternative` element. Not set outside of alternatives.

`beatBase` (positive exact rational or +inf.0)
: The musical length corresponding to one unit of `beatStructure`.

`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 exact rational or +inf.0)
: The musical length of the current measure.

`measurePosition` (moment)
: The current point within the measure.

`measureStartNow` (boolean)
: True at the beginning of a measure.

`timeSignature` (time signature)
: A time-signature specification. See the `\time` command.

`Tweak_engraver` (page 513)
: Read the `tweaks` property from the originating event, and set properties.

`Vertical_align_engraver` (page 513)
: 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 710), and VerticalAlignment (page 753).

Volta_engraver (page 513)
Make volta brackets.

Music types accepted: dal-segno-event (page 53), fine-event (page 53), and volta-span-event (page 62),

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.

This engraver creates the following layout object(s): VoltaBracket (page 757), and VoltaBracketSpanner (page 758).

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 314), and Staff (page 314).

This context creates the following layout object(s): BarLine (page 547), BreathingSign (page 565), CaesuraScript (page 568), DotColumn (page 600), InstrumentName (page 630), LedgerLineSpanner (page 643), StaffHighlight (page 711), StaffSpacing (page 712), StaffSymbol (page 713), and VerticalAxisGroup (page 754).

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 713), to 0.
- Set grob property line-count in StaffSymbol (page 713), to 1.
- Set grob property neutral-direction in Beam (page 557), to 1.
- Set grob property neutral-direction in Stem (page 715), to 1.
- Set grob property staff-padding in VoltaBracket (page 757), to 3.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type StandaloneRhythmVoice (page 359).

Context StandaloneRhythmStaff can contain CueVoice (page 102), NullVoice (page 252), StandaloneRhythmVoice (page 359), and Voice (page 444).

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

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Axis_group_engraver (page 458)
: 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 754).

Bar_engraver (page 459)
: 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 51), caesura-event (page 52), coda-mark-event (page 52), dal-segno-event (page 53), fine-event (page 53), section-event (page 58), and segno-mark-event (page 59),

  Properties (read)

  caesuraType (list)
  : An alist

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

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

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

`caesuraTypeTransform` (procedure)
: An engraver callback taking three arguments and returning an alist of the same kind as `caesuraType`.

  The first argument is the context.

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

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

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

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

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

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

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
: Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`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 time step.

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 547).

Caesura_engraver (page 466)
: 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 52),

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 565), and `CaesuraScript` (page 568).

`Dot_column_engraver` (page 473)
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 600).

`Font_size_engraver` (page 478)
Put `fontSize` into `font-size` grob property.

Properties (read)

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

`Instrument_name_engraver` (page 483)
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 630).

`Ledger_line_engraver` (page 486)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 643).

`Pitch_squash_engraver` (page 499)
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 502)
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 712).

`Staff_highlight_engraver` (page 505)
Highlights music passages.

Music types accepted: `staff-highlight-event` (page 59),

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 711).

`Staff_symbol_engraver` (page 506)
Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): `StaffSymbol` (page 713).

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 444).

This context creates the following layout object(s): `ApproximatePitchNoteHead` (page 542), `Arpeggio` (page 544), `Beam` (page 557), `BendAfter` (page 560), `BreathingSign` (page 565), `ChordBracket` (page 572), `ChordSlur` (page 574), `ClusterSpanner` (page 582), `ClusterSpannerBeacon` (page 582), `CombineTextScript` (page 585), `Dots` (page 600), `DoublePercentRepeat` (page 602), `DoublePercentRepeatCounter` (page 603), `DoubleRepeatSlash` (page 604), `DynamicLineSpanner` (page 607), `DynamicText` (page 609), `DynamicTextSpanner` (page 611), `FingerGlideSpanner` (page 613), `Fingering` (page 615), `Flag` (page 617), `Glissando` (page 622), `Hairpin` (page 626), `InstrumentSwitch` (page 631), `LaissezVibrerTie` (page 641), `LaissezVibrerTieColumn` (page 642), `LigatureBracket` (page 646), `MultiMeasureRest` (page 660), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestScript` (page 664), `MultiMeasureRestText` (page 665), `NoteColumn` (page 669), `NoteHead` (page 670), `NoteSpacing` (page 672), `PercentRepeat` (page 679), `PercentRepeatCounter` (page 680), `PhrasingSlur` (page 682), `RepeatSlash` (page 687), `RepeatTie` (page 688), `RepeatTieColumn` (page 689), `Rest` (page 689), `Script` (page 691), `ScriptColumn` (page 692), `Slur` (page 700), `Stem` (page 715), `StemStub` (page 717), `StemTremolo` (page 717), `StringNumber` (page 718), `StrokeFinger` (page 720), `TextScript` (page 733), `TextSpanner` (page 735), `Tie` (page 737), `TieColumn` (page 739), `TrillPitchAccidental` (page 742), `TrillPitchGroup` (page 743), `TrillPitchHead` (page 744), `TrillPitchParentheses` (page 745), `TrillSpanner` (page 746), `TupletBracket` (page 747), `TupletNumber` (page 749), and `VoiceFollower` (page 756).

This context sets the following properties:

- Set grob property `direction` in `Stem` (page 715), 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):

`Apply_output_engraver` (page 457)
: Apply a procedure to any grob acknowledged.

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

`Arpeggio_engraver` (page 457)
: Create arpeggiato and non-arpeggiato symbols.

  Music types accepted: `arpeggio-event` (page 51), `chord-slur-event` (page 52), and `non-arpeggiato-event` (page 56),

  This engraver creates the following layout object(s): `Arpeggio` (page 544), `ChordBracket` (page 572), and `ChordSlur` (page 574).

`Auto_beam_engraver` (page 457)
: Generate beams based on measure characteristics and observed Stems. Uses `beatBase`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through `Stem_engraver` (page 506), properties `stemLeftBeamCount` and `stemRightBeamCount`.

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

  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.

  `beamExceptions` (list)
  : An alist of exceptions to auto-beam 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.

  `beatBase` (positive exact rational or +inf.0)
  : The musical length corresponding to one unit of `beatStructure`.

  `beatStructure` (number list)
  : A sequence describing the length of each beat in the measure in units of `beatBase`.

  `subdivideBeams` (boolean)
  : If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

  This engraver creates the following layout object(s): `Beam` (page 557).

`Beam_engraver` (page 463)
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

  Properties (read)

  `beamMelismaBusy` (boolean)
  : Signal if a beam is present.

beatBase (positive exact rational or +inf.0)
The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Bend_engraver (page 465)
Create fall spanners.

Music types accepted: bend-after-event (page 52),

Properties (read)

currentBarLine (graphical (layout) object)
Set to the BarLine that Bar_engraver has created in the current time step.

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 560).

Breathing_sign_engraver (page 466)
Notate breath marks.

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

Properties (read)

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

This engraver creates the following layout object(s): BreathingSign (page 565).

Chord_tremolo_engraver (page 468)
Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 61),

This engraver creates the following layout object(s): Beam (page 557).

Cluster_spanner_engraver (page 469)
Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 52),

This engraver creates the following layout object(s): ClusterSpanner (page 582), and ClusterSpannerBeacon (page 582).

Dots_engraver (page 473)
Create Dots (page 600), objects for rhythmic-head-interface (page 827)s.

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

`Double_percent_repeat_engraver` (page 473)
Make double measure repeats.

Music types accepted: `double-percent-event` (page 53),

Properties (read)

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

`measureLength` (positive exact rational or +inf.0)
The musical length of the current measure.

`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 602), and `DoublePercentRepeatCounter` (page 603).

`Dynamic_align_engraver` (page 475)
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 607).

`Dynamic_engraver` (page 475)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 50), `break-dynamic-span-event` (page 52), and `span-dynamic-event` (page 59),

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 609), DynamicTextSpanner (page 611), and Hairpin (page 626).

Finger_glide_engraver (page 477)
Engraver to print a line between two Fingering, StringNumber or StrokeFinger grobs.

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

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

Fingering_engraver (page 478)
Create fingering scripts.

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

This engraver creates the following layout object(s): Fingering (page 615).

Font_size_engraver (page 478)
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 478)
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 480)
Engrave glissandi.

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

Properties (read)

glissandoMap (list)
A map in the form of '((source1 . target1) (source2 . target2) ... (source*n* . target*n*)), showing the glissandi to be drawn for note columns. The value '() defaults to '((0 . 0) (1 . 1) ... (*n* . *n*)), where *n* is the minimum number of note heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s): Glissando (page 622).

Grace_auto_beam_engraver (page 480)
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 52),

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 557).

`Grace_beam_engraver` (page 480)
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 51),

Properties (read)

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Grace_engraver` (page 481)
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 482)
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 483)
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 631).

`Laissez_vibrer_engraver` (page 486)
Create laissez vibrer items.

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

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 641), and `LaissezVibrerTieColumn` (page 642).

`Ligature_bracket_engraver` (page 487)
Handle `Ligature_events` by engraving `Ligature` brackets.

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

This engraver creates the following layout object(s): `LigatureBracket` (page 646).

`Multi_measure_rest_engraver` (page 492)
Engrave multi-measure rests that are produced with '`R`'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the `MultiMeasureRest` (page 660).

Music types accepted: `multi-measure-articulation-event` (page 55), `multi-measure-rest-event` (page 55), and `multi-measure-text-event` (page 55),

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 multi-measure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 660), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestScript` (page 664), and `MultiMeasureRestText` (page 665).

`New_fingering_engraver` (page 493)
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 615), `Script` (page 691), `StringNumber` (page 718), and `StrokeFinger` (page 720).

`Note_head_line_engraver` (page 493)
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 756).

`Note_heads_engraver` (page 494)
Generate note heads.

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

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): `ApproximatePitchNoteHead` (page 542), and `NoteHead` (page 670).

`Note_spacing_engraver` (page 495)
Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

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

`Part_combine_engraver` (page 496)
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted: `note-event` (page 56), and `part-combine-event` (page 57),

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 585).

`Percent_repeat_engraver` (page 497)
Make whole measure repeats.

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

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 679), and `PercentRepeatCounter` (page 680).

`Phrasing_slur_engraver` (page 497)
Print phrasing slurs. Similar to `Slur_engraver` (page 503).

Music types accepted: `note-event` (page 56), and `phrasing-slur-event` (page 57),

This engraver creates the following layout object(s): `PhrasingSlur` (page 682).

`Pitched_trill_engraver` (page 499)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 742), `TrillPitchGroup` (page 743), `TrillPitchHead` (page 744), and `TrillPitchParentheses` (page 745).

`Repeat_tie_engraver` (page 500)
Create repeat ties.

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

This engraver creates the following layout object(s): `RepeatTie` (page 688), and `RepeatTieColumn` (page 689).

`Rest_engraver` (page 500)
Engrave rests.

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

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 689).

`Rhythmic_column_engraver` (page 501)
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 669).

`Script_column_engraver` (page 501)
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 692).

`Script_engraver` (page 501)
Handle note scripted articulations.

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

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 691).

`Slash_repeat_engraver` (page 503)
Make beat repeats.

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

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 604), and `RepeatSlash` (page 687).

`Slur_engraver` (page 503)
Build slur grobs from slur events.

Music types accepted: `note-event` (page 56), and `slur-event` (page 59),

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 700).

`Spanner_break_forbid_engraver` (page 504)
Forbid breaks in certain spanners.

`Stem_engraver` (page 506)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 61),

Properties (read)

`currentBarLine` (graphical (layout) object)
Set to the `BarLine` that `Bar_engraver` has created in the current time step.

`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 617), `Stem` (page 715), `StemStub` (page 717), and `StemTremolo` (page 717).

`Text_engraver` (page 509)
Create text scripts.

Music types accepted: `text-script-event` (page 61),

This engraver creates the following layout object(s): `TextScript` (page 733).

`Text_spanner_engraver` (page 509)
Create text spanner from an event.

Music types accepted: `text-span-event` (page 61),

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 735).

`Tie_engraver` (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 61),

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 737), and `TieColumn` (page 739).

`Toe_heel_engraver` (page 512)
Read the `toeHeelStyle` context property and use it to style `\rtoe` and its siblings, based on the data in the `toe-heel-styles` alist.

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

Properties (read)

`toeHeelStyle` (symbol)
The style for the glyph shape and behavior of `\rtoe` and siblings. Possible values are `default`, `standard`, `reversed`, `circleheels`, and `below`. If not set (the default), use value `default`.

`Trill_spanner_engraver` (page 512)
Create trill spanners.

Music types accepted: `trill-span-event` (page 61),

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 746).

Tuplet_engraver (page 512)

Catch tuplet events and generate appropriate bracket.

Music types accepted: tuplet-span-event (page 62),

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 747), and TupletNumber (page 749).

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 314).

This context creates the following layout object(s): BarLine (page 547), BassFigure (page 553), BassFigureAlignment (page 553), BassFigureAlignmentPositioning (page 554), BassFigureBracket (page 555), BassFigureContinuation (page 556), BassFigureLine (page 556), BreathingSign (page 565), CaesuraScript (page 568), Clef (page 577), ClefModifier (page 580), CueClef (page 589), CueEndClef (page 592), DotColumn (page 600), FingeringColumn (page 617), InstrumentName (page 630), LedgerLineSpanner (page 643), NoteCollision (page 668), OptionalMaterialBracket (page 673), PianoPedalBracket (page 684), RestCollision (page 690), ScriptColumn (page 692), ScriptRow (page 693), SostenutoPedal (page 702), SostenutoPedalLineSpanner (page 704), StaffEllipsis (page 708), StaffHighlight (page 711), StaffSpacing (page 712), StaffSymbol (page 713), SustainPedal (page 722), SustainPedalLineSpanner (page 723), TimeSignature (page 739), UnaCordaPedal (page 750), UnaCordaPedalLineSpanner (page 752), and VerticalAxisGroup (page 754).

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 avoid-note-head in Stem (page 715), to #t.
- Set grob property beam-thickness in Beam (page 557), to 0.32.
- Set grob property beam-thickness in StemTremolo (page 717), to 0.32.
- Set grob property beam-width in StemTremolo (page 717), to stem-tremolo::calc-tab-width.
- Set grob property bound-details.left in Glissando (page 622), to :
  '((attach-dir . 1) (padding . 0.3))
- Set grob property bound-details.right in Glissando (page 622), to :
  '((attach-dir . -1) (padding . 0.3))
- Set grob property control-points in Slur (page 700), to #<unpure-pure-container #<program> #<program> >.
- Set grob property details in Stem (page 715), to :
  '((lengths 0 0 0 0 0 0)
  (beamed-lengths 0 0 0)
  (beamed-minimum-free-lengths 0 0 0)
  (beamed-extreme-minimum-free-lengths 0 0)
  (stem-shorten 0 0))
- Set grob property extra-dy in Glissando (page 622), to glissando::calc-tab-extra-dy.
- Set grob property glyph-name in TabNoteHead (page 729), to tab-note-head::calc-glyph-name.
- Set grob property ignore-collision in NoteColumn (page 669), to #t.
- Set grob property length-fraction in Beam (page 557), to 0.62.
- Set grob property length-fraction in StemTremolo (page 717), to #<program>.
- Set grob property no-stem-extend in Stem (page 715), to #t.
- Set grob property staff-space in StaffSymbol (page 713), to 1.5.
- Set grob property stencil in Arpeggio (page 544), to #f.
- Set grob property stencil in Beam (page 557), to #f.
- Set grob property stencil in Clef (page 577), to clef::print-modern-tab-if-set.
- Set grob property stencil in Dots (page 600), to #f.
- Set grob property stencil in DynamicTextSpanner (page 611), to #f.
- Set grob property stencil in DynamicText (page 609), to #f.
- Set grob property stencil in Flag (page 617), to #f.
- Set grob property stencil in Glissando (page 622), to glissando::draw-tab-glissando.
- Set grob property stencil in Hairpin (page 626), to #f.
- Set grob property stencil in LaissezVibrerTie (page 641), to #f.
- Set grob property stencil in MultiMeasureRestNumber (page 662), to #f.
- Set grob property stencil in MultiMeasureRestScript (page 664), to #f.
- Set grob property stencil in MultiMeasureRestText (page 665), to #f.
- Set grob property stencil in MultiMeasureRest (page 660), to #f.
- Set grob property stencil in PhrasingSlur (page 682), to #f.

- Set grob property `stencil` in `RepeatTie` (page 688), to `#f`.
- Set grob property `stencil` in `Rest` (page 689), to `#f`.
- Set grob property `stencil` in `Script` (page 691), to `#f`.
- Set grob property `stencil` in `StemTremolo` (page 717), to `#f`.
- Set grob property `stencil` in `Stem` (page 715), to `#f`.
- Set grob property `stencil` in `TabNoteHead` (page 729), to `tab-note-head::whiteout-if-style-set`.
- Set grob property `stencil` in `TextScript` (page 733), to `#f`.
- Set grob property `stencil` in `TextSpanner` (page 735), to `#f`.
- Set grob property `stencil` in `Tie` (page 737), to `#f`.
- Set grob property `stencil` in `TimeSignature` (page 739), to `#f`.
- Set grob property `stencil` in `TupletBracket` (page 747), to `#f`.
- Set grob property `stencil` in `TupletNumber` (page 749), to `#f`.
- Set grob property `style` in `Flag` (page 617), 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 382).

Context `TabStaff` can contain `CueVoice` (page 102), `NullVoice` (page 252), and `TabVoice` (page 382).

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

`Alteration_glyph_engraver` (page 456)
: 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.

`Apply_output_engraver` (page 457)
: Apply a procedure to any grob acknowledged.

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

`Axis_group_engraver` (page 458)
: 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 754).

Bar_engraver (page 459)

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 51), caesura-event (page 52), coda-mark-event (page 52), dal-segno-event (page 53), fine-event (page 53), section-event (page 58), and segno-mark-event (page 59),

Properties (read)

caesuraType (list)

An alist

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

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

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

caesuraTypeTransform (procedure)

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

The first argument is the context.

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

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

doubleRepeatBarType (string)

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

doubleRepeatSegnoBarType (string)

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

endRepeatBarType (string)

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

endRepeatSegnoBarType (string)

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

fineBarType (string)

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

submeasureBarType (string)
: Bar line to insert at submeasure boundaries specified by submeasureStructure, when submeasureBarsEnabled allows.

submeasureStructure (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of beatBase.

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 time step.

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 547).

Caesura_engraver (page 466)
: 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 52),

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 565), and `CaesuraScript` (page 568).

`Clef_engraver` (page 468)
: 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 577), and `ClefModifier` (page 580).

`Collision_engraver` (page 469)
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 668).

`Cue_clef_engraver` (page 471)
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 580), `CueClef` (page 589), and `CueEndClef` (page 592).

`Dot_column_engraver` (page 473)
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 600).

`Figured_bass_engraver` (page 477)
Make figured bass numbers.

Music types accepted: `bass-figure-event` (page 51), and `rest-event` (page 58),

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 553), BassFigureAlignment (page 553), BassFigureBracket (page 555), BassFigureContinuation (page 556), and BassFigureLine (page 556).

Figured_bass_position_engraver (page 477)
: Position figured bass alignments over notes.

This engraver creates the following layout object(s): BassFigureAlignmentPositioning (page 554).

Fingering_column_engraver (page 478)
: 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 617).

Font_size_engraver (page 478)
: Put fontSize into font-size grob property.

Properties (read)

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

Grob_pq_engraver (page 482)
: 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.).

Horizontal_script_engraver (page 482)
: Aligns Script horizontally

Instrument_name_engraver (page 483)
: 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 630).

Ledger_line_engraver (page 486)
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

  This engraver creates the following layout object(s): LedgerLineSpanner (page 643).

Merge_mmrest_numbers_engraver (page 491)
: 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 493)
: 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 692).

Optional_material_bracket_engraver (page 495)
: Notate in-staff brackets for optional material.

  Music types accepted: optional-material-event (page 57),

  This engraver creates the following layout object(s): OptionalMaterialBracket (page 673).

Piano_pedal_align_engraver (page 498)
: 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 704), SustainPedalLineSpanner (page 723), and UnaCordaPedalLineSpanner (page 752).

Piano_pedal_engraver (page 498)
: Engrave piano pedal symbols and brackets.

Music types accepted: sostenuto-event (page 59), sustain-event (page 61), and una-corda-event (page 62),

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 684), SostenutoPedal (page 702), SustainPedal (page 722), and UnaCordaPedal (page 750).

Pure_from_neighbor_engraver (page 499)
: Coordinates items that get their pure heights from their neighbors.

Rest_collision_engraver (page 500)
: 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 690).

Script_row_engraver (page 501)
: Determine order in horizontal side position elements.

This engraver creates the following layout object(s): ScriptRow (page 693).

Separating_line_group_engraver (page 502)
: 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 712).

Skip_typesetting_engraver (page 502)
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 708).

Staff_collecting_engraver (page 505)
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 505)
Highlights music passages.

Music types accepted: staff-highlight-event (page 59),

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 711).

Staff_symbol_engraver (page 506)
Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): StaffSymbol (page 713).

Tab_staff_symbol_engraver (page 508)
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 713).

Time_signature_engraver (page 510)
Create a TimeSignature (page 739), whenever timeSignature changes.

Music types accepted: polymetric-time-signature-event (page 58), and reference-time-signature-event (page 58),

Properties (read)

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

`partialBusy` (boolean)
: Signal that \partial acts at the current time step.

`timeSignature` (time signature)
: A time-signature specification. See the `\time` command.

This engraver creates the following layout object(s): `TimeSignature` (page 739).

2.1.38 TabVoice

The voice context used within a `TabStaff` context. Usually left to be created implicitly.

This context also accepts commands for the following context(s): `Voice` (page 444).

This context creates the following layout object(s): `Arpeggio` (page 544), `Beam` (page 557), `BendAfter` (page 560), `BendSpanner` (page 561), `BreathingSign` (page 565), `ChordBracket` (page 572), `ChordSlur` (page 574), `ClusterSpanner` (page 582), `ClusterSpannerBeacon` (page 582), `CombineTextScript` (page 585), `Dots` (page 600), `DoublePercentRepeat` (page 602), `DoublePercentRepeatCounter` (page 603), `DoubleRepeatSlash` (page 604), `DynamicLineSpanner` (page 607), `DynamicText` (page 609), `DynamicTextSpanner` (page 611), `FingerGlideSpanner` (page 613), `Flag` (page 617), `Glissando` (page 622), `Hairpin` (page 626), `InstrumentSwitch` (page 631), `LaissezVibrerTie` (page 641), `LaissezVibrerTieColumn` (page 642), `LigatureBracket` (page 646), `MultiMeasureRest` (page 660), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestScript` (page 664), `MultiMeasureRestText` (page 665), `NoteColumn` (page 669), `NoteSpacing` (page 672), `PercentRepeat` (page 679), `PercentRepeatCounter` (page 680), `PhrasingSlur` (page 682), `RepeatSlash` (page 687), `RepeatTie` (page 688), `RepeatTieColumn` (page 689), `Rest` (page 689), `Script` (page 691), `ScriptColumn` (page 692), `Slur` (page 700), `Stem` (page 715), `StemStub` (page 717), `StemTremolo` (page 717), `TabNoteHead` (page 729), `TextScript` (page 733), `TextSpanner` (page 735), `Tie` (page 737), `TieColumn` (page 739), `TrillSpanner` (page 746), `TupletBracket` (page 747), `TupletNumber` (page 749), and `VoiceFollower` (page 756).

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):

`Apply_output_engraver` (page 457)
: Apply a procedure to any grob acknowledged.

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

`Arpeggio_engraver` (page 457)
: Create arpeggiato and non-arpeggiato symbols.

  Music types accepted: `arpeggio-event` (page 51), `chord-slur-event` (page 52), and `non-arpeggiato-event` (page 56),

  This engraver creates the following layout object(s): `Arpeggio` (page 544), `ChordBracket` (page 572), and `ChordSlur` (page 574).

`Auto_beam_engraver` (page 457)
: Generate beams based on measure characteristics and observed Stems. Uses `beatBase`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through `Stem_engraver` (page 506), properties `stemLeftBeamCount` and `stemRightBeamCount`.

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

  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.

beamExceptions (list)
An alist of exceptions to auto-beam 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.

beatBase (positive exact rational or +inf.0)
The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Beam_engraver (page 463)
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

Properties (read)

beamMelismaBusy (boolean)
Signal if a beam is present.

beatBase (positive exact rational or +inf.0)
The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Bend_engraver (page 465)
Create fall spanners.

Music types accepted: bend-after-event (page 52),

Properties (read)

currentBarLine (graphical (layout) object)
Set to the BarLine that Bar_engraver has created in the current time step.

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 560).

Bend_spanner_engraver (page 465)
Engraver to print a BendSpanner.

Music types accepted: bend-span-event (page 52), note-event (page 56), and string-number-event (page 60),

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 561).

Breathing_sign_engraver (page 466)
Notate breath marks.

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

Properties (read)

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

This engraver creates the following layout object(s): BreathingSign (page 565).

Chord_tremolo_engraver (page 468)
Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 61),

This engraver creates the following layout object(s): Beam (page 557).

Cluster_spanner_engraver (page 469)
Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 52),

This engraver creates the following layout object(s): ClusterSpanner (page 582), and ClusterSpannerBeacon (page 582).

Dots_engraver (page 473)
Create Dots (page 600), objects for rhythmic-head-interface (page 827)s.

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

Double_percent_repeat_engraver (page 473)
Make double measure repeats.

Music types accepted: double-percent-event (page 53),

Properties (read)

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

`measureLength` (positive exact rational or +inf.0)
The musical length of the current measure.

`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 602), and `DoublePercentRepeatCounter` (page 603).

`Dynamic_align_engraver` (page 475)
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 607).

`Dynamic_engraver` (page 475)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 50), `break-dynamic-span-event` (page 52), and `span-dynamic-event` (page 59),

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 609), `DynamicTextSpanner` (page 611), and `Hairpin` (page 626).

`Finger_glide_engraver` (page 477)
Engraver to print a line between two `Fingering`, `StringNumber` or `StrokeFinger` grobs.

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

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

`Font_size_engraver` (page 478)
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 478)
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 480)
Engrave glissandi.

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

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 `'()` defaults to `'((0 . 0) (1 . 1) ... (n . n))`, where *n* is the minimum number of note heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s): `Glissando` (page 622).

`Grace_auto_beam_engraver` (page 480)
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 52),

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 557).

`Grace_beam_engraver` (page 480)
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 51),

Properties (read)

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Grace_engraver` (page 481)
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 482)
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 483)
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 631).

Laissez_vibrer_engraver (page 486)
Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 54),

This engraver creates the following layout object(s): LaissezVibrerTie (page 641), and LaissezVibrerTieColumn (page 642).

Ligature_bracket_engraver (page 487)
Handle Ligature_events by engraving Ligature brackets.

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

This engraver creates the following layout object(s): LigatureBracket (page 646).

Multi_measure_rest_engraver (page 492)
Engrave multi-measure rests that are produced with 'R'. It reads measureStartNow and internalBarNumber to determine what number to print over the MultiMeasureRest (page 660).

Music types accepted: multi-measure-articulation-event (page 55), multi-measure-rest-event (page 55), and multi-measure-text-event (page 55),

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 multi-measure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), and MultiMeasureRestText (page 665).

Note_head_line_engraver (page 493)
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 756).

Note_spacing_engraver (page 495)
Generate NoteSpacing, an object linking horizontal lines for use in spacing.

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

Part_combine_engraver (page 496)
Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted: note-event (page 56), and part-combine-event (page 57),

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 585).

Percent_repeat_engraver (page 497)
Make whole measure repeats.

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

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 679), and PercentRepeatCounter (page 680).

Phrasing_slur_engraver (page 497)
Print phrasing slurs. Similar to Slur_engraver (page 503).

Music types accepted: note-event (page 56), and phrasing-slur-event (page 57),

This engraver creates the following layout object(s): PhrasingSlur (page 682).

Repeat_tie_engraver (page 500)
Create repeat ties.

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

This engraver creates the following layout object(s): RepeatTie (page 688), and RepeatTieColumn (page 689).

Rest_engraver (page 500)
Engrave rests.

Music types accepted: rest-event (page 58),

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 689).

`Rhythmic_column_engraver` (page 501)
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 669).

`Script_column_engraver` (page 501)
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 692).

`Script_engraver` (page 501)
Handle note scripted articulations.

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

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 691).

`Slash_repeat_engraver` (page 503)
Make beat repeats.

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

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 604), and `RepeatSlash` (page 687).

`Slur_engraver` (page 503)
Build slur grobs from slur events.

Music types accepted: `note-event` (page 56), and `slur-event` (page 59),

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 700).

`Spanner_break_forbid_engraver` (page 504)
Forbid breaks in certain spanners.

`Stem_engraver` (page 506)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: `tremolo-event` (page 61),

Properties (read)

`currentBarLine` (graphical (layout) object)
Set to the `BarLine` that `Bar_engraver` has created in the current time step.

`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 617), `Stem` (page 715), `StemStub` (page 717), and `StemTremolo` (page 717).

`Tab_note_heads_engraver` (page 507)
Generate one or more tablature note heads from event of type `NoteEvent`.

Music types accepted: `fingering-event` (page 54), `note-event` (page 56), and `string-number-event` (page 60),

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 729).

`Tab_tie_follow_engraver` (page 508)
Adjust `TabNoteHead` properties when the `TabNoteHead` holds a `RepeatTie`, when a `Tie` ends and when a `Slur` or `Glissando` starts at a tied `TabNoteHead`.

Properties (read)

tabFullNotation (boolean)
Flag whether \tabFullNotation is used

Text_engraver (page 509)
Create text scripts.

Music types accepted: text-script-event (page 61),

This engraver creates the following layout object(s): TextScript (page 733).

Text_spanner_engraver (page 509)
Create text spanner from an event.

Music types accepted: text-span-event (page 61),

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 735).

Tie_engraver (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: tie-event (page 61),

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 737), and TieColumn (page 739).

Toe_heel_engraver (page 512)
Read the toeHeelStyle context property and use it to style \rtoe and its siblings, based on the data in the toe-heel-styles alist.

Music types accepted: articulation-event (page 51),

Properties (read)

toeHeelStyle (symbol)
The style for the glyph shape and behavior of \rtoe and siblings. Possible values are default, standard, reversed, circleheels, and below. If not set (the default), use value default.

Trill_spanner_engraver (page 512)
Create trill spanners.

Music types accepted: trill-span-event (page 61),

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 746).

Tuplet_engraver (page 512)
Catch tuplet events and generate appropriate bracket.

Music types accepted: tuplet-span-event (page 62),

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 747), and TupletNumber (page 749).

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 223).

This context creates the following layout object(s): InstrumentName (page 630), LyricExtender (page 647), LyricHyphen (page 648), LyricSpace (page 651), LyricText (page 651), StanzaNumber (page 714), VerticalAxisGroup (page 754), and VowelTransition (page 760).

This context sets the following properties:

- Set context property instrumentName to '().
- Set context property lyricRepeatCountFormatter to #<program>.
- Set context property searchForVoice to #f.
- Set context property shortInstrumentName to '().
- Set grob property bar-extent in BarLine (page 547), to :
  '(-0.05 . 0.05)
- Set grob property font-series in LyricHyphen (page 648), to 'normal.
- Set grob property font-size in InstrumentName (page 630), to 1.0.
- Set grob property font-size in LyricHyphen (page 648), to -4.
- Set grob property font-size in LyricText (page 651), to -4.
- Set grob property nonstaff-nonstaff-spacing in VerticalAxisGroup (page 754), to :

```
'((basic-distance . 0)
 (minimum-distance . 2.8)
 (padding . 0.2)
 (stretchability . 0))
```

- Set grob property nonstaff-relatedstaff-spacing in VerticalAxisGroup (page 754), to :
  '((basic-distance . 5.5) (padding . 0.5) (stretchability . 1))
- Set grob property nonstaff-unrelatedstaff-spacing.padding in VerticalAxisGroup (page 754), to 1.5.
- Set grob property remove-empty in VerticalAxisGroup (page 754), to #t.
- Set grob property remove-first in VerticalAxisGroup (page 754), to #t.
- Set grob property self-alignment-Y in InstrumentName (page 630), to #f.
- Set grob property short-bar-extent in BarLine (page 547), to :
  '(-0.05 . 0.05)
- Set grob property staff-affinity in VerticalAxisGroup (page 754), to 1.
- Set grob property stencil in LyricHyphen (page 648), 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 458)

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 754).

Extender_engraver (page 476)

Create lyric extenders.

Music types accepted: completize-extender-event (page 53), extender-event (page 53), hyphen-event (page 54), and lyric-event (page 55),

Properties (read)

autoExtenders (boolean)
: Create lyric extenders automatically for syllables in melismata that are not followed by a hyphen.

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

This engraver creates the following layout object(s): LyricExtender (page 647).

`Font_size_engraver` (page 478)
Put `fontSize` into `font-size` grob property.

Properties (read)

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

`Hyphen_engraver` (page 483)
Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted: `hyphen-event` (page 54), and `vowel-transition-event` (page 62),

This engraver creates the following layout object(s): `LyricHyphen` (page 648), `LyricSpace` (page 651), and `VowelTransition` (page 760).

`Instrument_name_engraver` (page 483)
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 630).

`Lyric_engraver` (page 487)
Engrave text for lyrics.

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

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 651).

`Pure_from_neighbor_engraver` (page 499)
Coordinates items that get their pure heights from their neighbors.

`Stanza_number_engraver` (page 506)

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 714).

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 289), and `Timing` (page 289).

This context creates the following layout object(s): `BreakAlignGroup` (page 563), `BreakAlignment` (page 564), `CenteredBarNumberLineSpanner` (page 570), `CodaMark` (page 583), `ControlPoint` (page 587), `ControlPolygon` (page 588), `Footnote` (page 618), `GraceSpacing` (page 623), `JumpScript` (page 633), `LeftEdge` (page 643), `MetronomeMark` (page 658), `NonMusicalPaperColumn` (page 667), `PaperColumn` (page 677), `Parentheses` (page 678), `RehearsalMark` (page 685), `SectionLabel` (page 693), `SegnoMark` (page 695), `SpacingSpanner` (page 705), `StaffGrouper` (page 710), `SystemStartBar` (page 725), `SystemStartBrace` (page 726), `SystemStartBracket` (page 727), `SystemStartSquare` (page 728), `TextMark` (page 731), `VerticalAlignment` (page 753), `VoltaBracket` (page 757), and `VoltaBracketSpanner` (page 758).

This context sets the following properties:

- Set context property `additionalPitchPrefix` to `"add"`.
- 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 #<program>)
  ```

- Set context property `autoBeamCheck` to `default-auto-beam-check`.
- Set context property `autoBeaming` to `#t`.
- Set context property `autoCautionaries` to `'()`.
- 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 #<program>
        "scripts.raltcomma"))
   (caesura
    (text #<program>
        "scripts.caesura.straight"))
   (chantdoublebar
  ```

```
 (extra-spacing-width -1.0 . 0.0)
 (stencil . #<program>)
 (Y-offset . 0.0))
(chantfullbar
 (extra-spacing-width -1.0 . 0.0)
 (stencil . #<program>)
 (Y-offset . 0.0))
(chanthalfbar
 (extra-spacing-height . #<program>)
 (extra-spacing-width -1.0 . 0.0)
 (stencil . #<program>)
 (Y-offset . 0.0))
(chantquarterbar
 (extra-spacing-height . #<program>)
 (extra-spacing-width -1.0 . 0.0)
 (stencil . #<program>))
(comma (text #<program>
        "scripts.rcomma"))
(curvedcaesura
 (text #<program>
     "scripts.caesura.curved"))
(outsidecomma
 (outside-staff-priority . 40)
 (text #<program> "scripts.rcomma"))
(spacer (text #<program>))
(tickmark
 (outside-staff-priority . 40)
 (text #<program>
     "scripts.tickmark"))
(upbow (outside-staff-priority . 40)
     (text #<program>
         "scripts.uupbow"))
(varcomma
 (text #<program>
     "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' >)
  #<program>
  ("+"))
 ((#<Pitch ees' > #<Pitch ges' >)
  #<program>
  ((#<program>
    ((#<program> 2 "°")))))
 ((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >)
  #<program>
  ((#<program> "ø")))
 ((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >)
```

```
#<program>
((#<program>
  ((#<program> 2 "°")))
 (#<program> "7")))
((#<Pitch e' >
 #<Pitch g' >
 #<Pitch bes' >
 #<Pitch des'' >
 #<Pitch ees'' >
 #<Pitch fis'' >
 #<Pitch aes'' >)
 #<program>
 ((#<program> "alt")))
((#<Pitch g' >)
 #<program>
 ((#<program> "5")))
((#<Pitch g' > #<Pitch c'' >)
 #<program>
 ((#<program> "5"))))
```

- Set context property `chordNameFunction` to `ignatzek-chord-names`.
- Set context property `chordNameLowercaseMinor` to `#f`.
- Set context property `chordNameSeparator` to:
  `'(#<program> 0.5)`
- Set context property `chordNoteNamer` to `#<program>`.
- Set context property `chordPrefixSpacer` to `0`.
- Set context property `chordRootNamer` to `#<program>`.
- 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 `#<program>`.
- 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 `deprecatedBarCheckSynchronize` to `#f`.
- 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:

```
'(#<program>
 ((#<program>
  -3
  (#<program> #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:

```
'("Sost. Ped." "*Sost. Ped." "*")
```

- Set context property `pedalSostenutoStyle` to `'mixed`.
- Set context property `pedalSustainStrings` to:

```
'("Ped." "*Ped." "*")
```

- Set context property `pedalSustainStyle` to `'text`.
- Set context property `pedalUnaCordaStrings` to:

```
'("una corda" "" "tre corde")
```

- Set context property `pedalUnaCordaStyle` to `'text`.
- Set context property `predefinedDiagramTable` to `#f`.
- Set context property `printAccidentalNames` to `#t`.
- Set context property `printKeyCancellation` to `#t`.
- Set context property `printOctaveNames` to `#f`.
- Set context property `printPartCombineTexts` to `#t`.
- Set context property `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 `#<program>`.
- 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-axis . 1)
 (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)
 (side-axis . 1)
 (direction . 1))
(altcomma
 (script-stencil feta "laltcomma" . "raltcomma")
 (quantize-position . #t)
 (padding . 0.2)
 (avoid-slur . ignore)
 (side-axis . 1)
 (direction . 1))
(bachschleifer
 (script-stencil feta "bachschleifer" . "bachschleifer")
 (no-ledgers . #f)
 (padding . 0.8)
 (length-fraction . 1.5)
 (avoid-slur . around)
 (side-axis . 0)
 (direction . -1)
 (staff-position . #<program>))
(circulus
 (script-stencil feta "circulus" . "circulus")
 (side-relative-direction . -1)
 (avoid-slur . ignore)
 (padding . 0.2)
 (quantize-position . #t)
 (script-priority . -100)
 (side-axis . 1)
 (direction . 1))
(coda (script-stencil feta "coda" . "coda")
    (padding . 0.2)
    (avoid-slur . outside)
    (side-axis . 1)
    (direction . 1))
(comma (script-stencil feta "lcomma" . "rcomma")
     (quantize-position . #t)
     (padding . 0.2)
     (avoid-slur . ignore)
     (side-axis . 1)
     (direction . 1))
(downbow
 (script-stencil feta "ddownbow" . "udownbow")
 (padding . 0.2)
 (skyline-horizontal-padding . 0.2)
 (avoid-slur . around)
```

```
 (direction . 1)
 (side-axis . 1)
 (script-priority . 180))
(downmordent
 (script-stencil feta "downmordent" . "downmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(downprall
 (script-stencil feta "downprall" . "downprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(espressivo
 (avoid-slur . around)
 (padding . 0.2)
 (script-stencil feta "espr" . "espr")
 (side-axis . 1)
 (side-relative-direction . -1))
(fermata
 (script-stencil feta "dfermata" . "ufermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(flageolet
 (script-stencil feta "flageolet" . "flageolet")
 (padding . 0.2)
 (avoid-slur . around)
 (direction . 1)
 (side-axis . 1)
 (script-priority . 50))
(halfopen
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil feta "halfopen" . "halfopen")
 (side-axis . 1)
 (direction . 1))
(halfopenvertical
 (avoid-slur . outside)
 (padding . 0.2)
 (script-stencil feta "halfopenvertical" . "halfopenvertical")
 (side-axis . 1)
 (direction . 1))
(haydnturn
 (script-stencil feta "haydnturn" . "haydnturn")
 (padding . 0.2)
 (avoid-slur . inside)
```

```
 (side-axis . 1)
 (direction . 1))
(heel (script-stencil feta "upedalheel" . "upedalheel")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . 1))
(heelcircle
 (script-stencil feta "pedalheelcircle" . "pedalheelcircle")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(henzelongfermata
 (script-stencil
  feta
  "dhenzelongfermata"
  .
  "uhenzelongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(henzeshortfermata
 (script-stencil
  feta
  "dhenzeshortfermata"
  .
  "uhenzeshortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(ictus (script-stencil feta "ictus" . "ictus")
    (side-relative-direction . -1)
    (quantize-position . #t)
    (avoid-slur . ignore)
    (padding . 0.2)
    (script-priority . -100)
    (side-axis . 1)
    (direction . -1))
(lheel (script-stencil feta "upedalheel" . "upedalheel")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . -1))
(lineprall
 (script-stencil feta "lineprall" . "lineprall")
```

```
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(longfermata
 (script-stencil feta "dlongfermata" . "ulongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(ltoe (script-stencil feta "upedaltoe" . "upedaltoe")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . -1))
(marcato
 (script-stencil feta "dmarcato" . "umarcato")
 (padding . 0.2)
 (avoid-slur . inside)
 (quantize-position . #t)
 (side-axis . 1)
 (side-relative-direction . -1))
(mordent
 (script-stencil feta "mordent" . "mordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(open (avoid-slur . outside)
    (padding . 0.2)
    (script-stencil feta "open" . "open")
    (side-axis . 1)
    (direction . 1))
(outsidecomma
 (avoid-slur . around)
 (direction . 1)
 (padding . 0.2)
 (side-axis . 1)
 (script-stencil feta "lcomma" . "rcomma"))
(portato
 (script-stencil feta "uportato" . "dportato")
 (avoid-slur . around)
 (padding . 0.45)
 (side-axis . 1)
 (side-relative-direction . -1))
(prall (script-stencil feta "prall" . "prall")
     (padding . 0.2)
     (avoid-slur . around)
     (side-axis . 1)
     (direction . 1))
```

```
(pralldown
 (script-stencil feta "pralldown" . "pralldown")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(prallmordent
 (script-stencil feta "prallmordent" . "prallmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(prallprall
 (script-stencil feta "prallprall" . "prallprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(prallup
 (script-stencil feta "prallup" . "prallup")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(reverseturn
 (script-stencil feta "reverseturn" . "reverseturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (side-axis . 1)
 (direction . 1))
(rheel (script-stencil feta "dpedalheel" . "dpedalheel")
     (padding . 0.2)
     (avoid-slur . around)
     (side-axis . 1)
     (direction . 1))
(rtoe (script-stencil feta "dpedaltoe" . "dpedaltoe")
    (padding . 0.2)
    (avoid-slur . around)
    (side-axis . 1)
    (direction . 1))
(segno (script-stencil feta "segno" . "segno")
     (padding . 0.2)
     (avoid-slur . outside)
     (side-axis . 1)
     (direction . 1))
(semicirculus
 (script-stencil feta "dsemicirculus" . "dsemicirculus")
 (side-relative-direction . -1)
 (quantize-position . #t)
 (avoid-slur . ignore)
 (padding . 0.2)
 (script-priority . -100)
```

```
 (side-axis . 1)
 (direction . 1))
(shortfermata
 (script-stencil feta "dshortfermata" . "ushortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(signumcongruentiae
 (script-stencil
  feta
  "dsignumcongruentiae"
  .
  "usignumcongruentiae")
 (padding . 0.2)
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(slashturn
 (script-stencil feta "slashturn" . "slashturn")
 (padding . 0.2)
 (avoid-slur . inside)
 (side-axis . 1)
 (direction . 1))
(snappizzicato
 (script-stencil feta "snappizzicato" . "snappizzicato")
 (padding . 0.2)
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(staccatissimo
 (avoid-slur . inside)
 (quantize-position . #t)
 (script-stencil feta "dstaccatissimo" . "ustaccatissimo")
 (padding . 0.2)
 (skyline-horizontal-padding . 0.1)
 (side-axis . 1)
 (side-relative-direction . -1)
 (toward-stem-shift . 1.0)
 (toward-stem-shift-in-column . 0.0))
(staccato
 (script-stencil feta "staccato" . "staccato")
 (side-axis . 1)
 (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)
 (side-axis . 1)
 (direction . 1))
(tenuto
 (script-stencil feta "tenuto" . "tenuto")
 (quantize-position . #t)
 (avoid-slur . inside)
 (padding . 0.2)
 (script-priority . -50)
 (side-axis . 1)
 (side-relative-direction . -1))
(toe (script-stencil feta "dpedaltoe" . "dpedaltoe")
   (padding . 0.2)
   (avoid-slur . around)
   (side-axis . 1)
   (direction . 1))
(trill (script-stencil feta "trill" . "trill")
    (direction . 1)
    (padding . 0.2)
    (avoid-slur . outside)
    (side-axis . 1)
    (script-priority . 150))
(turn (script-stencil feta "turn" . "turn")
    (avoid-slur . inside)
    (padding . 0.2)
    (side-axis . 1)
    (direction . 1))
(upbow (script-stencil feta "dupbow" . "uupbow")
    (avoid-slur . around)
    (padding . 0.2)
    (direction . 1)
    (side-axis . 1)
    (script-priority . 180))
(upmordent
 (script-stencil feta "upmordent" . "upmordent")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(upprall
 (script-stencil feta "upprall" . "upprall")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(varcoda
 (script-stencil feta "varcoda" . "varcoda")
 (padding . 0.2)
```

```
 (avoid-slur . outside)
 (side-axis . 1)
 (direction . 1))
(varcomma
 (script-stencil feta "lvarcomma" . "rvarcomma")
 (quantize-position . #t)
 (padding . 0.2)
 (avoid-slur . ignore)
 (side-axis . 1)
 (direction . 1))
(varheel
 (script-stencil feta "dpedalheel" . "dpedalheel")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(vartoe
 (script-stencil feta "upedaltoe" . "upedaltoe")
 (padding . 0.2)
 (avoid-slur . around)
 (side-axis . 1)
 (direction . 1))
(verylongfermata
 (script-stencil feta "dverylongfermata" . "uverylongfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (direction . 1))
(veryshortfermata
 (script-stencil
  feta
  "dveryshortfermata"
  .
  "uveryshortfermata")
 (padding . 0.4)
 (avoid-slur . around)
 (outside-staff-priority . 75)
 (script-priority . 175)
 (side-axis . 1)
 (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 submeasureBarsEnabled to #f.
- Set context property submeasureBarType to "!".
- 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 tempoCountPrecision to 1/4.
- Set context property tieWaitForNote to #f.
- Set context property timeSignatureSettings to:
  ```
  '(((2 . 2) (beamExceptions (end (1/32 8 8 8 8))))
   ((2 . 8) (beamExceptions (end (1/8 2))))
   ((3 . 2) (beamExceptions (end (1/32 8 8 8 8 8 8))))
   ((3 . 4) (beamExceptions (end (1/8 6) (1/12 3 3 3))))
   ((3 . 8) (beamExceptions (end (1/8 3))))
   ((4 . 2) (beamExceptions (end (1/16 4 4 4 4 4 4 4 4))))
   ((4 . 4) (beamExceptions (end (1/8 4 4) (1/12 3 3 3 3))))
   ((4 . 8) (beatStructure 2 2))
   ((6 . 4) (beamExceptions (end (1/16 4 4 4 4 4 4))))
   ((9 . 4) (beamExceptions (end (1/32 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))))
   ((5 . 8) (beatStructure 3 2))
   ((8 . 8) (beatStructure 3 3 2)))
  ```
- Set context property timeSignature to:
  ```
  '(4 . 4)
  ```
- 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 643), to :
  ```
  '(1.0 0.0 0.0)
  ```

- Set grob property color in StaffSymbol (page 713), to :
  '(1.0 0.0 0.0)
- Set grob property packed-spacing in SpacingSpanner (page 705), to #t.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type VaticanaStaff (page 419).

Context VaticanaScore can contain ChoirStaff (page 69), ChordNames (page 100), Devnull (page 113), DrumStaff (page 113), Dynamics (page 133), FiguredBass (page 138), FretBoards (page 140), GrandStaff (page 142), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), NoteNames (page 250), OneStaff (page 254), PetrucciStaff (page 255), PianoStaff (page 281), RhythmicStaff (page 283), Staff (page 314), StaffGroup (page 327), TabStaff (page 370), VaticanaLyrics (page 393), and VaticanaStaff (page 419).

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

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Beam_collision_engraver (page 463)
: Help beams avoid colliding with notes and clefs in other voices.

Break_align_engraver (page 465)
: 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 563), BreakAlignment (page 564), and LeftEdge (page 643).

Centered_bar_number_align_engraver (page 467)
: 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 570).

Concurrent_hairpin_engraver (page 470)
: Collect concurrent hairpins.

Footnote_engraver (page 478)
: Create footnote texts.

  This engraver creates the following layout object(s): Footnote (page 618).

Grace_spacing_engraver (page 481)
: 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 623).

`Jump_engraver` (page 484)
: 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 505), also needs to be there so that marks appear at the intended Y location.

  Music types accepted: `ad-hoc-jump-event` (page 51), `dal-segno-event` (page 53), and `fine-event` (page 53),

  Properties (read)

  `codaMarkCount` (non-negative, exact integer)
  : Updated at the end of each time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 633).

Mark_engraver (page 488)
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 505), 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 489). 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 583), RehearsalMark (page 685), SectionLabel (page 693), and SegnoMark (page 695).

Mark_tracking_translator (page 489)
This translator chooses which marks Mark_engraver should engrave.

Music types accepted: ad-hoc-mark-event (page 51), coda-mark-event (page 52), rehearsal-mark-event (page 58), section-label-event (page 58), and segno-mark-event (page 59),

Properties (read)

codaMarkCount (non-negative, exact integer)
Updated at the end of each time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 491)
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 Staff_collecting_engraver (page 505).

Music types accepted: tempo-change-event (page 61),

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 658).

`Paper_column_engraver` (page 496)

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 52), and `label-event` (page 54),

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 667), and `PaperColumn` (page 677).

`Parenthesis_engraver` (page 496)

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

This engraver creates the following layout object(s): `Parentheses` (page 678).

`Repeat_acknowledge_engraver` (page 499)

This engraver augments `repeatCommands` with `start-repeat` and `end-repeat` entries based on received events. This is internal behavior that allows simplifying other engravers that must support both `\repeat volta` and manual repeats.

This engraver also resets `repeatCommands` at the beginning of each time step. This is user-facing behavior: it allows setting a value for the current time step simply with `\set` rather than requiring `\once \set`.

Music types accepted: `volta-repeat-end-event` (page 62), and `volta-repeat-start-event` (page 62),

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 502)
: 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 587), and `ControlPolygon` (page 588).

`Spacing_engraver` (page 503)
: Make a `SpacingSpanner` and do bookkeeping of shortest starting and playing notes.

Music types accepted: `spacing-section-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.).

`proportionalNotationDuration` (non-negative exact rational or +inf.0)
: Global override for shortest-playing duration. This is used for switching on proportional notation.

This engraver creates the following layout object(s): `SpacingSpanner` (page 705).

`Spanner_tracking_engraver` (page 504)
: 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 505)
: 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 506)
: This engraver ensures that stanza numbers are neatly aligned.

`System_start_delimiter_engraver` (page 507)
: 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 725), `SystemStartBrace` (page 726), `SystemStartBracket` (page 727), and `SystemStartSquare` (page 728).

`Text_mark_engraver` (page 509)
Engraves arbitrary textual marks.

Music types accepted: `text-mark-event` (page 61),

Properties (read)

`stavesFound` (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): `TextMark` (page 731).

`Timing_translator` (page 511)
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 51), `bar-check-event` (page 51), `bar-event` (page 51), `fine-event` (page 53), `partial-event` (page 57), and `polymetric-time-signature-event` (page 58),

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.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`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 exact rational or +inf.0)
The musical length of the current measure.

`measurePosition` (moment)
The current point within the measure.

`timeSignature` (time signature)
A time-signature specification. See the `\time` command.

Properties (write)

`alternativeNumber` (non-negative, exact integer)
When set, the first volta number for the current `\alternative` element. Not set outside of alternatives.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`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 exact rational or +inf.0)
The musical length of the current measure.

`measurePosition` (moment)
The current point within the measure.

`measureStartNow` (boolean)
True at the beginning of a measure.

`timeSignature` (time signature)
A time-signature specification. See the `\time` command.

`Tweak_engraver` (page 513)
Read the `tweaks` property from the originating event, and set properties.

`Vertical_align_engraver` (page 513)
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 710), and `VerticalAlignment` (page 753).

`Volta_engraver` (page 513)
Make volta brackets.

Music types accepted: `dal-segno-event` (page 53), `fine-event` (page 53), and `volta-span-event` (page 62),

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.

This engraver creates the following layout object(s): VoltaBracket (page 757), and VoltaBracketSpanner (page 758).

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 314).

This context creates the following layout object(s): Accidental (page 533), AccidentalCautionary (page 534), AccidentalPlacement (page 535), AccidentalSuggestion (page 536), BarLine (page 547), BassFigure (page 553), BassFigureAlignment (page 553), BassFigureAlignmentPositioning (page 554), BassFigureBracket (page 555), BassFigureContinuation (page 556), BassFigureLine (page 556), Clef (page 577), ClefModifier (page 580), CueClef (page 589), CueEndClef (page 592), Custos (page 595), Divisio (page 597), DotColumn (page 600), FingeringColumn (page 617), InstrumentName (page 630), KeyCancellation (page 634), KeySignature (page 637), LedgerLineSpanner (page 643), NoteCollision (page 668), OptionalMaterialBracket (page 673), OttavaBracket (page 676), PianoPedalBracket (page 684), RestCollision (page 690), ScriptColumn (page 692), ScriptRow (page 693), SostenutoPedal (page 702), SostenutoPedalLineSpanner (page 704), StaffEllipsis (page 708), StaffHighlight (page 711), StaffSpacing (page 712), StaffSymbol (page 713), SustainPedal (page 722), SustainPedalLineSpanner (page 723), UnaCordaPedal (page 750), UnaCordaPedalLineSpanner (page 752), and VerticalAxisGroup (page 754).

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 #<program>)
```

- 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 startRepeatSegnoBarType to "S-||".
- Set context property startRepeatSegnoBarType to "S-||".
- Set context property submeasureBarType to '().
- Set context property underlyingRepeatBarType to "".
- Set context property underlyingRepeatBarType to "||".
- Set grob property extra-spacing-height in BreathingSign (page 565), to item::extra-spacing-height-including-staff.
- Set grob property extra-spacing-width in BreathingSign (page 565), to : '(-1.0 . 0.0)
- Set grob property font-size in BreathingSign (page 565), to -2.
- Set grob property font-size in Divisio (page 597), to -2.
- Set grob property hair-thickness in BarLine (page 547), to 0.65.
- Set grob property ledger-line-thickness in StaffSymbol (page 713), to : '(1 . 0)
- Set grob property length-fraction in Custos (page 595), to 2.8.
- Set grob property length-fraction in LedgerLineSpanner (page 643), to 0.9.
- Set grob property line-count in StaffSymbol (page 713), to 4.
- Set grob property neutral-direction in Custos (page 595), to -1.
- Set grob property neutral-position in Custos (page 595), to 3.
- Set grob property space-alist.clef in LeftEdge (page 643), to : '(extra-space . 0)
- Set grob property space-alist.custos in BarLine (page 547), to : '(minimum-space . 0.7)
- Set grob property space-alist.first-note in Clef (page 577), to : '(minimum-fixed-space . 1.4)
- Set grob property space-alist.right-edge in Custos (page 595), to : '(extra-space . 0)
- Set grob property style in Custos (page 595), to 'vaticana.
- Set grob property style in Dots (page 600), to 'vaticana.
- Set grob property thick-thickness in BarLine (page 547), to 1.8.
- Set grob property thickness in BreathingSign (page 565), to 1.3.
- Set grob property thickness in Divisio (page 597), to 1.3.
- Set grob property thickness in StaffSymbol (page 713), 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 434).

Context VaticanaStaff can contain CueVoice (page 102), NullVoice (page 252), and VaticanaVoice (page 434).

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

`Accidental_engraver` (page 455)
: 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 533), AccidentalCautionary (page 534), AccidentalPlacement (page 535), and AccidentalSuggestion (page 536).

Alteration_glyph_engraver (page 456)
: 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.

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 51),

Axis_group_engraver (page 458)
: 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 754).

`Bar_engraver` (page 459)

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 51), `caesura-event` (page 52), `coda-mark-event` (page 52), `dal-segno-event` (page 53), `fine-event` (page 53), `section-event` (page 58), and `segno-mark-event` (page 59),

Properties (read)

`caesuraType` (list)

An alist

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

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

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

`caesuraTypeTransform` (procedure)

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

The first argument is the context.

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

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

`doubleRepeatBarType` (string)

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

`doubleRepeatSegnoBarType` (string)

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

`endRepeatBarType` (string)

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

`endRepeatSegnoBarType` (string)

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

`fineBarType` (string)

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

`fineSegnoBarType` (string)

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
: Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`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 time step.

`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 547).

`Clef_engraver` (page 468)
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 577), and `ClefModifier` (page 580).

`Collision_engraver` (page 469)
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 668).

`Cue_clef_engraver` (page 471)
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 580), `CueClef` (page 589), and `CueEndClef` (page 592).

`Custos_engraver` (page 472)
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.

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): Custos (page 595).

Divisio_engraver (page 472)
Create divisiones: chant notation for points of breathing or caesura.

Music types accepted: caesura-event (page 52), fine-event (page 53), section-event (page 58), volta-repeat-end-event (page 62), and volta-repeat-start-event (page 62),

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 597).

Dot_column_engraver (page 473)
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 600).

Figured_bass_engraver (page 477)
Make figured bass numbers.

Music types accepted: bass-figure-event (page 51), and rest-event (page 58),

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 553), BassFigureAlignment (page 553), BassFigureBracket (page 555), BassFigureContinuation (page 556), and BassFigureLine (page 556).

Figured_bass_position_engraver (page 477)
Position figured bass alignments over notes.

This engraver creates the following layout object(s): BassFigureAlignmentPositioning (page 554).

Fingering_column_engraver (page 478)
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 617).

Font_size_engraver (page 478)
Put fontSize into font-size grob property.

Properties (read)

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

Grob_pq_engraver (page 482)
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.).

Horizontal_script_engraver (page 482)
Aligns Script horizontally

Instrument_name_engraver (page 483)
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 630).

`Key_engraver` (page 485)
Engrave a key signature.

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

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 634), and `KeySignature` (page 637).

`Ledger_line_engraver` (page 486)
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s): `LedgerLineSpanner` (page 643).

`Merge_mmrest_numbers_engraver` (page 491)
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 493)
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 692).

`Optional_material_bracket_engraver` (page 495)
Notate in-staff brackets for optional material.

Music types accepted: `optional-material-event` (page 57),

This engraver creates the following layout object(s): `OptionalMaterialBracket` (page 673).

`Ottava_spanner_engraver` (page 495)
Create a text spanner when the ottavation property changes.

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

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 676).

`Piano_pedal_align_engraver` (page 498)
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 704), `SustainPedalLineSpanner` (page 723), and `UnaCordaPedalLineSpanner` (page 752).

`Piano_pedal_engraver` (page 498)
Engrave piano pedal symbols and brackets.

Music types accepted: `sostenuto-event` (page 59), `sustain-event` (page 61), and `una-corda-event` (page 62),

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 684), `SostenutoPedal` (page 702), `SustainPedal` (page 722), and `UnaCordaPedal` (page 750).

`Pure_from_neighbor_engraver` (page 499)
Coordinates items that get their pure heights from their neighbors.

`Rest_collision_engraver` (page 500)
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 690).

`Script_row_engraver` (page 501)
Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 693).

`Separating_line_group_engraver` (page 502)
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 712).

`Skip_typesetting_engraver` (page 502)
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 708).

`Staff_collecting_engraver` (page 505)
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 505)
Highlights music passages.

Music types accepted: `staff-highlight-event` (page 59),

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 711).

`Staff_symbol_engraver` (page 506)
Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): `StaffSymbol` (page 713).

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 444).

This context creates the following layout object(s): ApproximatePitchNoteHead (page 542), Arpeggio (page 544), Beam (page 557), BendAfter (page 560), BreathingSign (page 565), ChordBracket (page 572), ChordSlur (page 574), ClusterSpanner (page 582), ClusterSpannerBeacon (page 582), CombineTextScript (page 585), DotColumn (page 600), Dots (page 600), DoublePercentRepeat (page 602), DoublePercentRepeatCounter (page 603), DoubleRepeatSlash (page 604), DynamicLineSpanner (page 607), DynamicText (page 609), DynamicTextSpanner (page 611), Episema (page 612), FingerGlideSpanner (page 613), Fingering (page 615), Glissando (page 622), Hairpin (page 626), InstrumentSwitch (page 631), LaissezVibrerTie (page 641), LaissezVibrerTieColumn (page 642), MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), MultiMeasureRestText (page 665), NoteColumn (page 669), NoteHead (page 670), NoteSpacing (page 672), PercentRepeat (page 679), PercentRepeatCounter (page 680), PhrasingSlur (page 682), RepeatSlash (page 687), RepeatTie (page 688), RepeatTieColumn (page 689), Rest (page 689), Script (page 691), ScriptColumn (page 692), StringNumber (page 718), StrokeFinger (page 720), TextScript (page 733), Tie (page 737), TieColumn (page 739), TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), TrillPitchParentheses (page 745), TrillSpanner (page 746), TupletBracket (page 747), TupletNumber (page 749), VaticanaLigature (page 753), and VoiceFollower (page 756).

This context sets the following properties:

- Set context property autoBeaming to #f.
- Set grob property bound-details.left.padding in Episema (page 612), to 0.05.
- Set grob property bound-details.right.padding in Episema (page 612), to 0.05.
- Set grob property style in NoteHead (page 670), to 'vaticana.punctum.
- Set grob property thickness in Episema (page 612), 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):

Apply_output_engraver (page 457)
: Apply a procedure to any grob acknowledged.

  Music types accepted: apply-output-event (page 51),

Arpeggio_engraver (page 457)
: Create arpeggiato and non-arpeggiato symbols.

  Music types accepted: arpeggio-event (page 51), chord-slur-event (page 52), and non-arpeggiato-event (page 56),

  This engraver creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), and ChordSlur (page 574).

Auto_beam_engraver (page 457)
: Generate beams based on measure characteristics and observed Stems. Uses beatBase, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Stem_engraver (page 506), properties stemLeftBeamCount and stemRightBeamCount.

  Music types accepted: beam-forbid-event (page 52),

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.

`beamExceptions` (list)
An alist of exceptions to auto-beam 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.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Beam_engraver` (page 463)
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

Properties (read)

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Bend_engraver` (page 465)
Create fall spanners.

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

Properties (read)

`currentBarLine` (graphical (layout) object)
Set to the `BarLine` that `Bar_engraver` has created in the current time step.

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 560).

Breathing_sign_engraver (page 466)
Notate breath marks.

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

Properties (read)

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

This engraver creates the following layout object(s): BreathingSign (page 565).

Chord_tremolo_engraver (page 468)
Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 61),

This engraver creates the following layout object(s): Beam (page 557).

Cluster_spanner_engraver (page 469)
Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 52),

This engraver creates the following layout object(s): ClusterSpanner (page 582), and ClusterSpannerBeacon (page 582).

Dots_engraver (page 473)
Create Dots (page 600), objects for rhythmic-head-interface (page 827)s.

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

Double_percent_repeat_engraver (page 473)
Make double measure repeats.

Music types accepted: double-percent-event (page 53),

Properties (read)

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

measureLength (positive exact rational or +inf.0)
The musical length of the current measure.

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 602), and DoublePercentRepeatCounter (page 603).

`Dynamic_align_engraver` (page 475)
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 607).

`Dynamic_engraver` (page 475)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 50), `break-dynamic-span-event` (page 52), and `span-dynamic-event` (page 59),

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 609), `DynamicTextSpanner` (page 611), and `Hairpin` (page 626).

`Episema_engraver` (page 476)
Create an *Editio Vaticana*-style episema line.

Music types accepted: `episema-event` (page 53),

This engraver creates the following layout object(s): `Episema` (page 612).

`Finger_glide_engraver` (page 477)
Engraver to print a line between two `Fingering`, `StringNumber` or `StrokeFinger` grobs.

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

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

`Fingering_engraver` (page 478)
Create fingering scripts.

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

This engraver creates the following layout object(s): `Fingering` (page 615).

`Font_size_engraver` (page 478)
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 478)
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 480)
Engrave glissandi.

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

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 `'()` defaults to `'((0 . 0) (1 . 1) ... (n . n))`, where *n* is the minimum number of note heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s): `Glissando` (page 622).

`Grace_auto_beam_engraver` (page 480)
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 52),

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 557).

`Grace_beam_engraver` (page 480)
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 51),

Properties (read)

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Grace_engraver` (page 481)
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 482)
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 483)
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 631).

`Laissez_vibrer_engraver` (page 486)
Create laissez vibrer items.

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

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 641), and `LaissezVibrerTieColumn` (page 642).

`Multi_measure_rest_engraver` (page 492)
Engrave multi-measure rests that are produced with '`R`'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the `MultiMeasureRest` (page 660).

Music types accepted: multi-measure-articulation-event (page 55), multi-measure-rest-event (page 55), and multi-measure-text-event (page 55),

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 multi-measure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), and MultiMeasureRestText (page 665).

New_fingering_engraver (page 493)
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 615), Script (page 691), StringNumber (page 718), and StrokeFinger (page 720).

Note_head_line_engraver (page 493)
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 756).

Note_heads_engraver (page 494)
Generate note heads.

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

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): ApproximatePitchNoteHead (page 542), and NoteHead (page 670).

Note_spacing_engraver (page 495)
Generate NoteSpacing, an object linking horizontal lines for use in spacing.

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

Part_combine_engraver (page 496)
Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted: note-event (page 56), and part-combine-event (page 57),

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 585).

Percent_repeat_engraver (page 497)
Make whole measure repeats.

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

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 679), and PercentRepeatCounter (page 680).

Phrasing_slur_engraver (page 497)
Print phrasing slurs. Similar to Slur_engraver (page 503).

Music types accepted: note-event (page 56), and phrasing-slur-event (page 57),

This engraver creates the following layout object(s): PhrasingSlur (page 682).

`Pitched_trill_engraver` (page 499)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): `TrillPitchAccidental` (page 742), `TrillPitchGroup` (page 743), `TrillPitchHead` (page 744), and `TrillPitchParentheses` (page 745).

`Repeat_tie_engraver` (page 500)
Create repeat ties.

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

This engraver creates the following layout object(s): `RepeatTie` (page 688), and `RepeatTieColumn` (page 689).

`Rest_engraver` (page 500)
Engrave rests.

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

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 689).

`Rhythmic_column_engraver` (page 501)
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): `NoteColumn` (page 669).

`Script_column_engraver` (page 501)
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 692).

`Script_engraver` (page 501)
Handle note scripted articulations.

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

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 691).

`Slash_repeat_engraver` (page 503)
Make beat repeats.

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

This engraver creates the following layout object(s): `DoubleRepeatSlash` (page 604), and `RepeatSlash` (page 687).

`Spanner_break_forbid_engraver` (page 504)
Forbid breaks in certain spanners.

`Text_engraver` (page 509)
Create text scripts.

Music types accepted: `text-script-event` (page 61),

This engraver creates the following layout object(s): `TextScript` (page 733).

`Tie_engraver` (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 61),

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 737), and `TieColumn` (page 739).

`Toe_heel_engraver` (page 512)
Read the `toeHeelStyle` context property and use it to style `\rtoe` and its siblings, based on the data in the `toe-heel-styles` alist.

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

Properties (read)

`toeHeelStyle` (symbol)
The style for the glyph shape and behavior of `\rtoe` and siblings. Possible values are `default`, `standard`, `reversed`, `circleheels`, and `below`. If not set (the default), use value `default`.

`Trill_spanner_engraver` (page 512)
Create trill spanners.

Music types accepted: `trill-span-event` (page 61),

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 746).

`Tuplet_engraver` (page 512)
Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 62),

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 747), and TupletNumber (page 749).

Vaticana_ligature_engraver (page 513)
Handle ligatures by glueing special ligature heads together.

Music types accepted: ligature-event (page 55), and pes-or-flexa-event (page 57),

This engraver creates the following layout object(s): DotColumn (page 600), and VaticanaLigature (page 753).

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): ApproximatePitchNoteHead (page 542), Arpeggio (page 544), Beam (page 557), BendAfter (page 560), BreathingSign (page 565), ChordBracket (page 572), ChordSlur (page 574), ClusterSpanner (page 582), ClusterSpannerBeacon (page 582), CombineTextScript (page 585), Dots (page 600), DoublePercentRepeat (page 602), DoublePercentRepeatCounter (page 603), DoubleRepeatSlash (page 604), DynamicLineSpanner (page 607), DynamicText (page 609), DynamicTextSpanner (page 611), FingerGlideSpanner (page 613), Fingering (page 615), Flag (page 617), Glissando (page 622), Hairpin (page 626), InstrumentSwitch (page 631), LaissezVibrerTie (page 641), LaissezVibrerTieColumn (page 642), LigatureBracket (page 646), MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), MultiMeasureRestText (page 665), NoteColumn (page 669), NoteHead (page 670), NoteSpacing (page 672), PercentRepeat (page 679), PercentRepeatCounter (page 680), PhrasingSlur (page 682), RepeatSlash (page 687), RepeatTie (page 688), RepeatTieColumn (page 689), Rest (page 689), Script (page 691), ScriptColumn (page 692), Slur (page 700), Stem (page 715), StemStub (page 717), StemTremolo (page 717), StringNumber (page 718), StrokeFinger (page 720), TextScript (page 733), TextSpanner (page 735), Tie (page 737), TieColumn (page 739), TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), TrillPitchParentheses (page 745), TrillSpanner (page 746), TupletBracket (page 747), TupletNumber (page 749), and VoiceFollower (page 756).

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):

Apply_output_engraver (page 457)
Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 51),

Arpeggio_engraver (page 457)
Create arpeggiato and non-arpeggiato symbols.

Music types accepted: arpeggio-event (page 51), chord-slur-event (page 52), and non-arpeggiato-event (page 56),

This engraver creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), and ChordSlur (page 574).

Auto_beam_engraver (page 457)
Generate beams based on measure characteristics and observed Stems. Uses beatBase, beatStructure, beamExceptions, measureLength, and measurePosition to decide

when to start and stop a beam. Overriding beaming is done through Stem_engraver (page 506), properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 52),

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.

beamExceptions (list)
: An alist of exceptions to auto-beam 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.

beatBase (positive exact rational or +inf.0)
: The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
: A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
: If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Beam_engraver (page 463)
: Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

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

Properties (read)

beamMelismaBusy (boolean)
: Signal if a beam is present.

beatBase (positive exact rational or +inf.0)
: The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
: A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
: If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Bend_engraver (page 465)
: Create fall spanners.

Music types accepted: bend-after-event (page 52),

Properties (read)

`currentBarLine` (graphical (layout) object)
Set to the `BarLine` that `Bar_engraver` has created in the current time step.

`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 560).

`Breathing_sign_engraver` (page 466)
Notate breath marks.

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

Properties (read)

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

This engraver creates the following layout object(s): `BreathingSign` (page 565).

`Chord_tremolo_engraver` (page 468)
Generate beams for tremolo repeats.

Music types accepted: `tremolo-span-event` (page 61),

This engraver creates the following layout object(s): `Beam` (page 557).

`Cluster_spanner_engraver` (page 469)
Engrave a cluster using `Spanner` notation.

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

This engraver creates the following layout object(s): `ClusterSpanner` (page 582), and `ClusterSpannerBeacon` (page 582).

`Dots_engraver` (page 473)
Create `Dots` (page 600), objects for `rhythmic-head-interface` (page 827)s.

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

`Double_percent_repeat_engraver` (page 473)
Make double measure repeats.

Music types accepted: `double-percent-event` (page 53),

Properties (read)

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

`measureLength` (positive exact rational or +inf.0)
The musical length of the current measure.

`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 602), and `DoublePercentRepeatCounter` (page 603).

`Dynamic_align_engraver` (page 475)
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 607).

`Dynamic_engraver` (page 475)
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: `absolute-dynamic-event` (page 50), `break-dynamic-span-event` (page 52), and `span-dynamic-event` (page 59),

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 609), `DynamicTextSpanner` (page 611), and `Hairpin` (page 626).

`Finger_glide_engraver` (page 477)
Engraver to print a line between two `Fingering`, `StringNumber` or `StrokeFinger` grobs.

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

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

`Fingering_engraver` (page 478)
Create fingering scripts.

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

This engraver creates the following layout object(s): `Fingering` (page 615).

Font_size_engraver (page 478)
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 478)
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 480)
Engrave glissandi.

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

Properties (read)

glissandoMap (list)
A map in the form of '((source1 . target1) (source2 . target2) ... (source*n* . target*n*)), showing the glissandi to be drawn for note columns. The value '() defaults to '((0 . 0) (1 . 1) ... (*n* . *n*)), where *n* is the minimum number of note heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s): Glissando (page 622).

Grace_auto_beam_engraver (page 480)
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 52),

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 557).

Grace_beam_engraver (page 480)
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 51),

Properties (read)

beamMelismaBusy (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Grace_engraver` (page 481)
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 482)
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 483)
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 631).

`Laissez_vibrer_engraver` (page 486)
Create laissez vibrer items.

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

This engraver creates the following layout object(s): `LaissezVibrerTie` (page 641), and `LaissezVibrerTieColumn` (page 642).

`Ligature_bracket_engraver` (page 487)
Handle `Ligature_events` by engraving `Ligature` brackets.

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

This engraver creates the following layout object(s): `LigatureBracket` (page 646).

`Multi_measure_rest_engraver` (page 492)
Engrave multi-measure rests that are produced with 'R'. It reads `measureStartNow` and `internalBarNumber` to determine what number to print over the `MultiMeasureRest` (page 660).

Music types accepted: `multi-measure-articulation-event` (page 55), `multi-measure-rest-event` (page 55), and `multi-measure-text-event` (page 55),

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 multi-measure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 660), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestScript` (page 664), and `MultiMeasureRestText` (page 665).

`New_fingering_engraver` (page 493)
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 615), `Script` (page 691), `StringNumber` (page 718), and `StrokeFinger` (page 720).

`Note_head_line_engraver` (page 493)
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 756).

`Note_heads_engraver` (page 494)
Generate note heads.

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

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): ApproximatePitchNoteHead (page 542), and NoteHead (page 670).

Note_spacing_engraver (page 495)
: Generate NoteSpacing, an object linking horizontal lines for use in spacing.

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

Part_combine_engraver (page 496)
: Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted: note-event (page 56), and part-combine-event (page 57),

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 585).

Percent_repeat_engraver (page 497)
: Make whole measure repeats.

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

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 679), and PercentRepeatCounter (page 680).

Phrasing_slur_engraver (page 497)
Print phrasing slurs. Similar to Slur_engraver (page 503).

Music types accepted: note-event (page 56), and phrasing-slur-event (page 57),

This engraver creates the following layout object(s): PhrasingSlur (page 682).

Pitched_trill_engraver (page 499)
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s): TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), and TrillPitchParentheses (page 745).

Repeat_tie_engraver (page 500)
Create repeat ties.

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

This engraver creates the following layout object(s): RepeatTie (page 688), and RepeatTieColumn (page 689).

Rest_engraver (page 500)
Engrave rests.

Music types accepted: rest-event (page 58),

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 689).

Rhythmic_column_engraver (page 501)
Generate NoteColumn, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s): NoteColumn (page 669).

Script_column_engraver (page 501)
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 692).

Script_engraver (page 501)
Handle note scripted articulations.

Music types accepted: articulation-event (page 51),

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 691).

Slash_repeat_engraver (page 503)
Make beat repeats.

Music types accepted: repeat-slash-event (page 58),

This engraver creates the following layout object(s): DoubleRepeatSlash (page 604), and RepeatSlash (page 687).

Slur_engraver (page 503)
Build slur grobs from slur events.

Music types accepted: note-event (page 56), and slur-event (page 59),

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 700).

Spanner_break_forbid_engraver (page 504)
Forbid breaks in certain spanners.

Stem_engraver (page 506)
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted: tremolo-event (page 61),

Properties (read)

currentBarLine (graphical (layout) object)
Set to the BarLine that Bar_engraver has created in the current time step.

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 617), Stem (page 715), StemStub (page 717), and StemTremolo (page 717).

Text_engraver (page 509)
Create text scripts.

Music types accepted: text-script-event (page 61),

This engraver creates the following layout object(s): TextScript (page 733).

Text_spanner_engraver (page 509)
Create text spanner from an event.

Music types accepted: text-span-event (page 61),

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 735).

`Tie_engraver` (page 509)
Generate ties between note heads of equal pitch.

Music types accepted: `tie-event` (page 61),

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 737), and `TieColumn` (page 739).

`Toe_heel_engraver` (page 512)
Read the `toeHeelStyle` context property and use it to style `\rtoe` and its siblings, based on the data in the `toe-heel-styles` alist.

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

Properties (read)

`toeHeelStyle` (symbol)
The style for the glyph shape and behavior of `\rtoe` and siblings. Possible values are `default`, `standard`, `reversed`, `circleheels`, and `below`. If not set (the default), use value `default`.

`Trill_spanner_engraver` (page 512)
Create trill spanners.

Music types accepted: `trill-span-event` (page 61),

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 746).

`Tuplet_engraver` (page 512)
Catch tuplet events and generate appropriate bracket.

Music types accepted: `tuplet-span-event` (page 62),

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 747), and `TupletNumber` (page 749).

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 533), AccidentalCautionary (page 534), AccidentalPlacement (page 535), and AccidentalSuggestion (page 536).

Accidental_engraver is part of the following context(s) in \layout: GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), and VaticanaStaff (page 419).

2.2.2 Alteration_glyph_engraver

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

Properties (read)

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

Alteration_glyph_engraver is part of the following context(s) in \layout: ChordGrid (page 71), ChordNames (page 100), DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), NoteNames (page 250), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.3 Ambitus_engraver

Create an ambitus.

Properties (read)

keyAlterations (list)
: The current key signature. This is an alist containing (*step* . *alter*) or ((*octave* . *step*) . *alter*), where *step* is a number in the range 0 to 6 and *alter* a fraction, denoting alteration. For alterations, use symbols, e.g., keyAlterations = #`((6 . ,FLAT)).

middleCClefPosition (number)
: The position of the middle C, as determined only by the clef. This can be calculated by looking at clefPosition and clefGlyph.

middleCCuePosition (number)
: The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at cueClefPosition and cueClefGlyph.

middleCOffset (number)
: The offset of middle C from the position given by middleCClefPosition This is used for ottava brackets.

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

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

This engraver creates the following layout object(s): AccidentalPlacement (page 535), Ambitus (page 538), AmbitusAccidental (page 540), AmbitusLine (page 540), and AmbitusNoteHead (page 541).

Ambitus_engraver is not part of any context

2.2.4 Apply_output_engraver

Apply a procedure to any grob acknowledged.

Music types accepted: apply-output-event (page 51),

Apply_output_engraver is part of the following context(s) in \layout: ChoirStaff (page 69), ChordGrid (page 71), ChordGridScore (page 77), ChordNames (page 100), CueVoice (page 102), DrumStaff (page 113), DrumVoice (page 123), Dynamics (page 133), FretBoards (page 140), GrandStaff (page 142), GregorianTranscriptionStaff (page 147), GregorianTranscriptionVoice (page 160), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), KievanVoice (page 212), MensuralStaff (page 225), MensuralVoice (page 240), PetrucciStaff (page 255), PetrucciVoice (page 270), PianoStaff (page 281), RhythmicStaff (page 283), Score (page 289), Staff (page 314), StaffGroup (page 327), StandaloneRhythmScore (page 329), StandaloneRhythmStaff (page 353), StandaloneRhythmVoice (page 359), TabStaff (page 370), TabVoice (page 382), VaticanaScore (page 396), VaticanaStaff (page 419), VaticanaVoice (page 434), and Voice (page 444).

2.2.5 Arpeggio_engraver

Create arpeggiato and non-arpeggiato symbols.

Music types accepted: arpeggio-event (page 51), chord-slur-event (page 52), and non-arpeggiato-event (page 56),

This engraver creates the following layout object(s): Arpeggio (page 544), ChordBracket (page 572), and ChordSlur (page 574).

Arpeggio_engraver is part of the following context(s) in \layout: CueVoice (page 102), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.6 Auto_beam_engraver

Generate beams based on measure characteristics and observed Stems. Uses beatBase, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Stem_engraver (page 506), properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted: beam-forbid-event (page 52),

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.

beamExceptions (list)
: An alist of exceptions to auto-beam 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.

beatBase (positive exact rational or +inf.0)
: The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
: A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
: If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Auto_beam_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.7 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 754).

Axis_group_engraver is part of the following context(s) in \layout: ChordGrid (page 71), ChordNames (page 100), DrumStaff (page 113), Dynamics (page 133), FiguredBass (page 138), FretBoards (page 140), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), NoteNames (page 250), OneStaff (page 254), PetrucciStaff

(page 255), RhythmicStaff (page 283), Staff (page 314), StandaloneRhythmStaff (page 353), TabStaff (page 370), VaticanaLyrics (page 393), and VaticanaStaff (page 419).

2.2.8 Balloon_engraver

Create balloon texts.

Music types accepted: annotate-output-event (page 51),

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

Balloon_engraver is not part of any context

2.2.9 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 51), caesura-event (page 52), coda-mark-event (page 52), dal-segno-event (page 53), fine-event (page 53), section-event (page 58), and segno-mark-event (page 59),

Properties (read)

caesuraType (list)
: An alist

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

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

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

caesuraTypeTransform (procedure)
: An engraver callback taking three arguments and returning an alist of the same kind as caesuraType.

The first argument is the context.

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

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

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

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

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

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

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

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

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

`forbidBreakBetweenBarLines` (boolean)
: If set to `#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.|:`'.

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`submeasureBarType` (string)
: Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`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 time step.

`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 547).

`Bar_engraver` is part of the following context(s) in `\layout`: `ChordGrid` (page 71), `DrumStaff` (page 113), `Dynamics` (page 133), `GregorianTranscriptionStaff` (page 147), `InternalGregorianStaff` (page 171), `InternalMensuralStaff` (page 184), `KievanStaff` (page 198), `MensuralStaff` (page 225), `PetrucciStaff` (page 255), `RhythmicStaff` (page 283), `Staff` (page 314), `StandaloneRhythmStaff` (page 353), `TabStaff` (page 370), and `VaticanaStaff` (page 419).

2.2.10 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 `Staff_collecting_engraver` (page 505). 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 first volta number for the current `\alternative` element. Not set outside of alternatives.

`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)
: The current point within the measure.

`stavesFound` (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s): `BarNumber` (page 551), and `CenteredBarNumber` (page 569).

`Bar_number_engraver` is part of the following context(s) in `\layout`: `Score` (page 289), and `StandaloneRhythmScore` (page 329).

2.2.11 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 77), `Score` (page 289), `StandaloneRhythmScore` (page 329), and `VaticanaScore` (page 396).

2.2.12 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 51),

Properties (read)

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatBase` (positive exact rational or +inf.0)
The musical length corresponding to one unit of `beatStructure`.

`beatStructure` (number list)
A sequence describing the length of each beat in the measure in units of `beatBase`.

`subdivideBeams` (boolean)
If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

This engraver creates the following layout object(s): `Beam` (page 557).

`Beam_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 102), `DrumVoice` (page 123), `GregorianTranscriptionVoice` (page 160), `KievanVoice` (page 212), `MensuralVoice` (page 240), `NullVoice` (page 252), `PetrucciVoice` (page 270), `StandaloneRhythmVoice` (page 359), `TabVoice` (page 382), `VaticanaVoice` (page 434), and `Voice` (page 444).

2.2.13 Beam_performer

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

`Beam_performer` is part of the following context(s) in `\midi`: `ChordNames` (page 100), `CueVoice` (page 102), `DrumVoice` (page 123), `GregorianTranscriptionVoice` (page 160), `KievanVoice` (page 212), `MensuralVoice` (page 240), `NullVoice` (page 252), `PetrucciVoice` (page 270), `TabVoice` (page 382), `VaticanaVoice` (page 434), and `Voice` (page 444).

2.2.14 Beat_engraver

This engraver is just a functionally identical copy of Section 2.2.15 [`Beat_performer`], page 464, used for visualizing its effects. You can also use it for showcasing the effects of the current `beatStructure`.

Music types accepted: `articulation-event` (page 51), and `note-event` (page 56),

Properties (read)

barExtraVelocity (integer)
: Extra MIDI velocity added by the 'Beat_performer' at the start of each measure.

beatBase (positive exact rational or +inf.0)
: The musical length corresponding to one unit of beatStructure.

beatExtraVelocity (integer)
: Extra MIDI velocity added by the 'Beat_performer' at the start of each beat.

beatStructure (number list)
: A sequence describing the length of each beat in the measure in units of beatBase.

measurePosition (moment)
: The current point within the measure.

timeSignature (time signature)
: A time-signature specification. See the \time command.

timing (boolean)
: Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

Beat_engraver is not part of any context

2.2.15 Beat_performer

This performer is intended for instantiation in 'Voice'-like contexts. The context variable beatExtraVelocity is used for adding extra MIDI velocity at each beat (default 15) in accordance with beatStructure and an additional barExtraVelocity (default 10) at the start of each bar.

This is done by adding corresponding \accent and \marcato events when such note events are encountered.

Off-beat manual use of \accent or \marcato causes auto-generation of the next on-beat accent to be skipped.

Music types accepted: articulation-event (page 51), and note-event (page 56),

Properties (read)

barExtraVelocity (integer)
: Extra MIDI velocity added by the 'Beat_performer' at the start of each measure.

beatBase (positive exact rational or +inf.0)
: The musical length corresponding to one unit of beatStructure.

beatExtraVelocity (integer)
: Extra MIDI velocity added by the 'Beat_performer' at the start of each beat.

beatStructure (number list)
: A sequence describing the length of each beat in the measure in units of beatBase.

measurePosition (moment)
: The current point within the measure.

timeSignature (time signature)
: A time-signature specification. See the \time command.

timing (boolean)
: Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

Beat_performer is not part of any context

2.2.16 Bend_engraver

Create fall spanners.

Music types accepted: bend-after-event (page 52),

Properties (read)

currentBarLine (graphical (layout) object)
: Set to the BarLine that Bar_engraver has created in the current time step.

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 560).

Bend_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.17 Bend_spanner_engraver

Engraver to print a BendSpanner.

Music types accepted: bend-span-event (page 52), note-event (page 56), and string-number-event (page 60),

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 561).

Bend_spanner_engraver is part of the following context(s) in \layout: TabVoice (page 382).

2.2.18 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 563), BreakAlignment (page 564), and LeftEdge (page 643).

Break_align_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.19 Breathing_sign_engraver

Notate breath marks.

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

Properties (read)

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

This engraver creates the following layout object(s): BreathingSign (page 565).

Breathing_sign_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.20 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 52),

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 565), and `CaesuraScript` (page 568).

`Caesura_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 113), `InternalMensuralStaff` (page 184), `KievanStaff` (page 198), `MensuralStaff` (page 225), `PetrucciStaff` (page 255), `RhythmicStaff` (page 283), `Staff` (page 314), `StandaloneRhythmStaff` (page 353), and `TabStaff` (page 370).

2.2.21 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 570).

`Centered_bar_number_align_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 77), `Score` (page 289), `StandaloneRhythmScore` (page 329), and `VaticanaScore` (page 396).

2.2.22 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 573).

`Chord_name_engraver` is part of the following context(s) in `\layout`: `ChordNames` (page 100).

2.2.23 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 576).

Chord_square_engraver is part of the following context(s) in \layout: ChordGrid (page 71).

2.2.24 Chord_tremolo_engraver

Generate beams for tremolo repeats.

Music types accepted: tremolo-span-event (page 61),

This engraver creates the following layout object(s): Beam (page 557).

Chord_tremolo_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.25 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 577), and ClefModifier (page 580).

Clef_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.26 Cluster_spanner_engraver

Engrave a cluster using Spanner notation.

Music types accepted: cluster-note-event (page 52),

This engraver creates the following layout object(s): ClusterSpanner (page 582), and ClusterSpannerBeacon (page 582).

Cluster_spanner_engraver is part of the following context(s) in \layout: CueVoice (page 102), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.27 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 668).

Collision_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.28 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 56),

Properties (read)

completionFactor (an exact rational or procedure)
: When Completion_heads_engraver and Completion_rest_engraver need to split a note or rest with a scaled duration, such as c2*3, this specifies the scale factor to use for the newly-split notes and rests created by the engraver.

  If #f, the completion engraver uses the scale-factor of each duration being split.

  If set to a callback procedure, that procedure is called with the context of the completion engraver, and the duration to be split.

completionUnit (positive exact rational or +inf.0)
: Sub-bar unit of completion.

measureLength (positive exact rational or +inf.0)
: The musical length of the current measure.

measurePosition (moment)
: The current point within the measure.

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 670), Tie (page 737), and TieColumn (page 739).

Completion_heads_engraver is not part of any context

2.2.29 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 58),

Properties (read)

completionFactor (an exact rational or procedure)
: When Completion_heads_engraver and Completion_rest_engraver need to split a note or rest with a scaled duration, such as c2*3, this specifies the scale factor to use for the newly-split notes and rests created by the engraver.

  If #f, the completion engraver uses the scale-factor of each duration being split.

  If set to a callback procedure, that procedure is called with the context of the completion engraver, and the duration to be split.

completionUnit (positive exact rational or +inf.0)
: Sub-bar unit of completion.

measureLength (positive exact rational or +inf.0)
: The musical length of the current measure.

measurePosition (moment)
: The current point within the measure.

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 689).

Completion_rest_engraver is not part of any context

2.2.30 Concurrent_hairpin_engraver

Collect concurrent hairpins.

Concurrent_hairpin_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.31 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 77), and Score (page 289).

2.2.32 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 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 580), `CueClef` (page 589), and `CueEndClef` (page 592).

`Cue_clef_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 113), `GregorianTranscriptionStaff` (page 147), `InternalGregorianStaff` (page 171), `InternalMensuralStaff` (page 184), `KievanStaff` (page 198), `MensuralStaff` (page 225), `PetrucciStaff` (page 255), `Staff` (page 314), `TabStaff` (page 370), and `VaticanaStaff` (page 419).

2.2.33 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 54), and `note-event` (page 56),

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 71), and `ChordNames` (page 100).

2.2.34 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.

`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): `Custos` (page 595).

`Custos_engraver` is part of the following context(s) in `\layout`: `InternalMensuralStaff` (page 184), `MensuralStaff` (page 225), `PetrucciStaff` (page 255), and `VaticanaStaff` (page 419).

2.2.35 Divisio_engraver

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

Music types accepted: `caesura-event` (page 52), `fine-event` (page 53), `section-event` (page 58), `volta-repeat-end-event` (page 62), and `volta-repeat-start-event` (page 62),

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 597).

Divisio_engraver is part of the following context(s) in \layout: GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), and VaticanaStaff (page 419).

2.2.36 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 600).

Dot_column_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), RhythmicStaff (page 283), Staff (page 314), StandaloneRhythmStaff (page 353), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.37 Dots_engraver

Create Dots (page 600), objects for rhythmic-head-interface (page 827)s.

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

Dots_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.38 Double_percent_repeat_engraver

Make double measure repeats.

Music types accepted: double-percent-event (page 53),

Properties (read)

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

measureLength (positive exact rational or +inf.0)
: The musical length of the current measure.

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 602), and `DoublePercentRepeatCounter` (page 603).

`Double_percent_repeat_engraver` is part of the following context(s) in `\layout`: `ChordGrid` (page 71), `CueVoice` (page 102), `DrumVoice` (page 123), `GregorianTranscriptionVoice` (page 160), `KievanVoice` (page 212), `MensuralVoice` (page 240), `PetrucciVoice` (page 270), `StandaloneRhythmVoice` (page 359), `TabVoice` (page 382), `VaticanaVoice` (page 434), and `Voice` (page 444).

2.2.39 Drum_note_performer

Play drum notes.

Music types accepted: `articulation-event` (page 51), `note-event` (page 56), and `tie-event` (page 61),

`Drum_note_performer` is part of the following context(s) in `\midi`: `DrumVoice` (page 123).

2.2.40 Drum_notes_engraver

Generate drum note heads.

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

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 670), and `Script` (page 691).

`Drum_notes_engraver` is part of the following context(s) in `\layout`: `DrumVoice` (page 123).

2.2.41 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 53),

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 605).

Duration_line_engraver is not part of any context

2.2.42 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 607).

Dynamic_align_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), Dynamics (page 133), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.43 Dynamic_engraver

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted: absolute-dynamic-event (page 50), break-dynamic-span-event (page 52), and span-dynamic-event (page 59),

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 609), DynamicTextSpanner (page 611), and Hairpin (page 626).

Dynamic_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), Dynamics (page 133), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.44 Dynamic_performer

Music types accepted: absolute-dynamic-event (page 50), crescendo-event (page 53), and decrescendo-event (page 53),

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 100), CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.45 Episema_engraver

Create an *Editio Vaticana*-style episema line.

Music types accepted: episema-event (page 53),

This engraver creates the following layout object(s): Episema (page 612).

Episema_engraver is part of the following context(s) in \layout: GregorianTranscriptionVoice (page 160), and VaticanaVoice (page 434).

2.2.46 Extender_engraver

Create lyric extenders.

Music types accepted: completize-extender-event (page 53), extender-event (page 53), hyphen-event (page 54), and lyric-event (page 55),

Properties (read)

autoExtenders (boolean)
: Create lyric extenders automatically for syllables in melismata that are not followed by a hyphen.

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

This engraver creates the following layout object(s): LyricExtender (page 647).

Extender_engraver is part of the following context(s) in \layout: GregorianTranscriptionLyrics (page 144), Lyrics (page 223), and VaticanaLyrics (page 393).

2.2.47 Figured_bass_engraver

Make figured bass numbers.

Music types accepted: bass-figure-event (page 51), and rest-event (page 58),

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 553), BassFigureAlignment (page 553), BassFigureBracket (page 555), BassFigureContinuation (page 556), and BassFigureLine (page 556).

Figured_bass_engraver is part of the following context(s) in \layout: DrumStaff (page 113), FiguredBass (page 138), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.48 Figured_bass_position_engraver

Position figured bass alignments over notes.

This engraver creates the following layout object(s): BassFigureAlignmentPositioning (page 554).

Figured_bass_position_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.49 Finger_glide_engraver

Engraver to print a line between two Fingering, StringNumber or StrokeFinger grobs.

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

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

Finger_glide_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.50 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 617).

Fingering_column_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.51 Fingering_engraver

Create fingering scripts.

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

This engraver creates the following layout object(s): Fingering (page 615).

Fingering_engraver is part of the following context(s) in \layout: CueVoice (page 102), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), VaticanaVoice (page 434), and Voice (page 444).

2.2.52 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 102), DrumStaff (page 113), DrumVoice (page 123), Dynamics (page 133), FretBoards (page 140), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), GregorianTranscriptionVoice (page 160), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), KievanVoice (page 212), Lyrics (page 223), MensuralStaff (page 225), MensuralVoice (page 240), PetrucciStaff (page 255), PetrucciVoice (page 270), RhythmicStaff (page 283), Staff (page 314), StandaloneRhythmStaff (page 353), StandaloneRhythmVoice (page 359), TabStaff (page 370), TabVoice (page 382), VaticanaLyrics (page 393), VaticanaStaff (page 419), VaticanaVoice (page 434), and Voice (page 444).

2.2.53 Footnote_engraver

Create footnote texts.

This engraver creates the following layout object(s): Footnote (page 618).

Footnote_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.54 Forbid_line_break_engraver

Forbid line breaks when note heads are still playing at some point.

Properties (read)

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

Properties (write)

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

`Forbid_line_break_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 102), `DrumVoice` (page 123), `GregorianTranscriptionVoice` (page 160), `KievanVoice` (page 212), `MensuralVoice` (page 240), `PetrucciVoice` (page 270), `StandaloneRhythmVoice` (page 359), `TabVoice` (page 382), `VaticanaVoice` (page 434), and `Voice` (page 444).

2.2.55 Fretboard_engraver

Generate fret diagram from one or more events of type `NoteEvent`.

Music types accepted: `fingering-event` (page 54), `note-event` (page 56), and `string-number-event` (page 60),

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 620).

`Fretboard_engraver` is part of the following context(s) in `\layout`: `FretBoards` (page 140).

2.2.56 Glissando_engraver

Engrave glissandi.

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

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 '() defaults to '((0 . 0) (1 . 1) ... (n . n)), where n is the minimum number of note heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s): Glissando (page 622).

Glissando_engraver is part of the following context(s) in \layout: CueVoice (page 102), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.57 Grace_auto_beam_engraver

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

Music types accepted: beam-forbid-event (page 52),

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 557).

Grace_auto_beam_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.58 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 51),

Properties (read)

beamMelismaBusy (boolean)
: Signal if a beam is present.

beatBase (positive exact rational or +inf.0)
: The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
: A sequence describing the length of each beat in the measure in units of beatBase.

subdivideBeams (boolean)
: If set, beams of multiple stems may be subdivided by omitting a number of beamlets, dependent on beamMaximumSubdivision, between beats at multiples of beamMinimumSubdivision.

This engraver creates the following layout object(s): Beam (page 557).

Grace_beam_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.59 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 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.60 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 623).

Grace_spacing_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.61 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 623).

Grid_chord_name_engraver is part of the following context(s) in \layout: ChordGrid (page 71).

2.2.62 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 624).

Grid_line_span_engraver is not part of any context

2.2.63 Grid_point_engraver

Generate grid points.

Properties (read)

gridInterval (positive exact rational or +inf.0)
: Interval for which to generate GridPoints.

This engraver creates the following layout object(s): GridPoint (page 625).

Grid_point_engraver is not part of any context

2.2.64 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 102), DrumStaff (page 113), DrumVoice (page 123), GregorianTranscriptionStaff (page 147), GregorianTranscriptionVoice (page 160), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), KievanVoice (page 212), MensuralStaff (page 225), MensuralVoice (page 240), NullVoice (page 252), PetrucciStaff (page 255), PetrucciVoice (page 270), Staff (page 314), StandaloneRhythmVoice (page 359), TabStaff (page 370), TabVoice (page 382), VaticanaStaff (page 419), VaticanaVoice (page 434), and Voice (page 444).

2.2.65 Horizontal_bracket_engraver

Create horizontal brackets over notes for musical analysis purposes.

Music types accepted: note-grouping-event (page 57),

This engraver creates the following layout object(s): HorizontalBracket (page 627), and HorizontalBracketText (page 629).

Horizontal_bracket_engraver is not part of any context

2.2.66 Horizontal_script_engraver

Aligns Script horizontally

Horizontal_script_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.67 Hyphen_engraver

Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted: hyphen-event (page 54), and vowel-transition-event (page 62),

This engraver creates the following layout object(s): LyricHyphen (page 648), LyricSpace (page 651), and VowelTransition (page 760).

Hyphen_engraver is part of the following context(s) in \layout: GregorianTranscriptionLyrics (page 144), Lyrics (page 223), and VaticanaLyrics (page 393).

2.2.68 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 630).

Instrument_name_engraver is part of the following context(s) in \layout: ChoirStaff (page 69), DrumStaff (page 113), FretBoards (page 140), GrandStaff (page 142), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), PetrucciStaff (page 255), PianoStaff (page 281), RhythmicStaff (page 283), Staff (page 314), StaffGroup (page 327), StandaloneRhythmStaff (page 353), TabStaff (page 370), VaticanaLyrics (page 393), and VaticanaStaff (page 419).

2.2.69 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 631).

Instrument_switch_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.70 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 505), also needs to be there so that marks appear at the intended Y location.

Music types accepted: ad-hoc-jump-event (page 51), dal-segno-event (page 53), and fine-event (page 53),

Properties (read)

codaMarkCount (non-negative, exact integer)
: Updated at the end of each time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 633).

Jump_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.71 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 281).

2.2.72 Key_engraver

Engrave a key signature.

Music types accepted: key-change-event (page 54),

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 634), and KeySignature (page 637).

Key_engraver is part of the following context(s) in \layout: GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), and VaticanaStaff (page 419).

2.2.73 Key_performer

Music types accepted: key-change-event (page 54),

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 113), GregorianTranscriptionStaff (page 147), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), RhythmicStaff (page 283), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.74 Kievan_ligature_engraver

Handle Kievan_ligature_events by glueing Kievan heads together.

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

This engraver creates the following layout object(s): KievanLigature (page 640).

Kievan_ligature_engraver is part of the following context(s) in \layout: KievanVoice (page 212).

2.2.75 Laissez_vibrer_engraver

Create laissez vibrer items.

Music types accepted: laissez-vibrer-event (page 54),

This engraver creates the following layout object(s): LaissezVibrerTie (page 641), and LaissezVibrerTieColumn (page 642).

Laissez_vibrer_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.76 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 643).

Ledger_line_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff

(page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), RhythmicStaff (page 283), Staff (page 314), StandaloneRhythmStaff (page 353), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.77 Ligature_bracket_engraver

Handle Ligature_events by engraving Ligature brackets.

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

This engraver creates the following layout object(s): LigatureBracket (page 646).

Ligature_bracket_engraver is part of the following context(s) in \layout: CueVoice (page 102), StandaloneRhythmVoice (page 359), TabVoice (page 382), and Voice (page 444).

2.2.78 Lyric_engraver

Engrave text for lyrics.

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

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 651).

Lyric_engraver is part of the following context(s) in \layout: GregorianTranscriptionLyrics (page 144), Lyrics (page 223), and VaticanaLyrics (page 393).

2.2.79 Lyric_performer

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

Lyric_performer is part of the following context(s) in \midi: GregorianTranscriptionLyrics (page 144), and Lyrics (page 223).

2.2.80 Lyric_repeat_count_engraver

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

Music types accepted: volta-repeat-end-event (page 62),

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 649).

Lyric_repeat_count_engraver is part of the following context(s) in \layout: GregorianTranscriptionLyrics (page 144).

2.2.81 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 505), 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 489). 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 583), RehearsalMark (page 685), SectionLabel (page 693), and SegnoMark (page 695).

Mark_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.82 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 77), and Score (page 289).

2.2.83 Mark_tracking_translator

This translator chooses which marks Mark_engraver should engrave.

Music types accepted: ad-hoc-mark-event (page 51), coda-mark-event (page 52), rehearsal-mark-event (page 58), section-label-event (page 58), and segno-mark-event (page 59),

Properties (read)

codaMarkCount (non-negative, exact integer)
: Updated at the end of each time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 time step in which a coda mark appears: not set during the first time step, 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 time step in which a segno appears: not set during the first time step, 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 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396); in \midi: ChordGridScore (page 77), and Score (page 289).

2.2.84 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 55),

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)
The current point within the measure.

This engraver creates the following layout object(s): MeasureCounter (page 653).

Measure_counter_engraver is not part of any context

2.2.85 Measure_grouping_engraver

Create MeasureGrouping to indicate beat subdivision.

Properties (read)

beatBase (positive exact rational or +inf.0)
The musical length corresponding to one unit of beatStructure.

beatStructure (number list)
A sequence describing the length of each beat in the measure in units of beatBase.

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

measurePosition (moment)
The current point within the measure.

This engraver creates the following layout object(s): MeasureGrouping (page 655).

Measure_grouping_engraver is not part of any context

2.2.86 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 55),

Properties (read)

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

measurePosition (moment)
The current point within the measure.

This engraver creates the following layout object(s): MeasureSpanner (page 656).

Measure_spanner_engraver is not part of any context

2.2.87 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 time step.

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 658).

Melody_engraver is not part of any context

2.2.88 Mensural_ligature_engraver

Handle Mensural_ligature_events by glueing special ligature heads together.

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

This engraver creates the following layout object(s): MensuralLigature (page 658).

Mensural_ligature_engraver is part of the following context(s) in \layout: MensuralVoice (page 240), and PetrucciVoice (page 270).

2.2.89 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 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.90 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

2.2.91 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 Staff_collecting_engraver (page 505).

Music types accepted: tempo-change-event (page 61),

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 658).

Metronome_mark_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.92 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 113), `GregorianTranscriptionStaff` (page 147), `KievanStaff` (page 198), `MensuralStaff` (page 225), `PetrucciStaff` (page 255), `RhythmicStaff` (page 283), `Staff` (page 314), `TabStaff` (page 370), and `VaticanaStaff` (page 419).

2.2.93 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 `MultiMeasureRest` (page 660).

Music types accepted: `multi-measure-articulation-event` (page 55), `multi-measure-rest-event` (page 55), and `multi-measure-text-event` (page 55),

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 multi-measure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s): `MultiMeasureRest` (page 660), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestScript` (page 664), and `MultiMeasureRestText` (page 665).

`Multi_measure_rest_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 102), `DrumVoice` (page 123), `GregorianTranscriptionVoice` (page 160), `KievanVoice`

(page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.94 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 615), Script (page 691), StringNumber (page 718), and StrokeFinger (page 720).

New_fingering_engraver is part of the following context(s) in \layout: CueVoice (page 102), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), VaticanaVoice (page 434), and Voice (page 444).

2.2.95 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 692).

Non_musical_script_column_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.96 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 756).

Note_head_line_engraver is part of the following context(s) in \layout: CueVoice (page 102), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.97 Note_heads_engraver

Generate note heads.

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

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): ApproximatePitchNoteHead (page 542), and NoteHead (page 670).

Note_heads_engraver is part of the following context(s) in \layout: CueVoice (page 102), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), NullVoice (page 252), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), VaticanaVoice (page 434), and Voice (page 444).

2.2.98 Note_name_engraver

Print pitches as words.

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

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 671).

Note_name_engraver is part of the following context(s) in \layout: NoteNames (page 250).

2.2.99 Note_performer

Music types accepted: articulation-event (page 51), breathing-event (page 52), note-event (page 56), and tie-event (page 61),

Note_performer is part of the following context(s) in \midi: ChordNames (page 100), CueVoice (page 102), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.100 Note_spacing_engraver

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

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

Note_spacing_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.101 Optional_material_bracket_engraver

Notate in-staff brackets for optional material.

Music types accepted: optional-material-event (page 57),

This engraver creates the following layout object(s): OptionalMaterialBracket (page 673).

Optional_material_bracket_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.102 Ottava_spanner_engraver

Create a text spanner when the ottavation property changes.

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

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 676).

Ottava_spanner_engraver is part of the following context(s) in \layout: GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), and VaticanaStaff (page 419).

2.2.103 Page_turn_engraver

Decide where page turns are allowed to go.

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

Properties (read)

currentBarLine (graphical (layout) object)
: Set to the BarLine that Bar_engraver has created in the current time step.

pageTurnMinimumRepeatLength (non-negative exact rational or +inf.0)
: Minimum length of a repeated section for a page turn to be allowed within that section.

pageTurnMinimumRestLength (non-negative exact rational or +inf.0)
: Minimum length of a rest for a page turn to be allowed.

Page_turn_engraver is not part of any context

2.2.104 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 52), and label-event (page 54),

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 667), and PaperColumn (page 677).

Paper_column_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.105 Parenthesis_engraver

Parenthesize objects whose parenthesize property is #t.

This engraver creates the following layout object(s): Parentheses (page 678).

Parenthesis_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.106 Part_combine_engraver

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

Music types accepted: note-event (page 56), and part-combine-event (page 57),

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 585).

Part_combine_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.107 Percent_repeat_engraver

Make whole measure repeats.

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

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 679), and PercentRepeatCounter (page 680).

Percent_repeat_engraver is part of the following context(s) in \layout: ChordGrid (page 71), CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.108 Phrasing_slur_engraver

Print phrasing slurs. Similar to Slur_engraver (page 503).

Music types accepted: note-event (page 56), and phrasing-slur-event (page 57),

This engraver creates the following layout object(s): PhrasingSlur (page 682).

Phrasing_slur_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.109 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 704), SustainPedalLineSpanner (page 723), and UnaCordaPedalLineSpanner (page 752).

Piano_pedal_align_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.110 Piano_pedal_engraver

Engrave piano pedal symbols and brackets.

Music types accepted: sostenuto-event (page 59), sustain-event (page 61), and una-corda-event (page 62),

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 684), SostenutoPedal (page 702), SustainPedal (page 722), and UnaCordaPedal (page 750).

Piano_pedal_engraver is part of the following context(s) in \layout: Dynamics (page 133), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.111 Piano_pedal_performer

Music types accepted: sostenuto-event (page 59), sustain-event (page 61), and una-corda-event (page 62),

Piano_pedal_performer is part of the following context(s) in \midi: ChordNames (page 100), CueVoice (page 102), DrumVoice (page 123), Dynamics (page 133), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.112 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 252), RhythmicStaff (page 283), and StandaloneRhythmStaff (page 353).

2.2.113 Pitched_trill_engraver

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

This engraver creates the following layout object(s): TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), and TrillPitchParentheses (page 745).

Pitched_trill_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), VaticanaVoice (page 434), and Voice (page 444).

2.2.114 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 100), DrumStaff (page 113), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), VaticanaLyrics (page 393), and VaticanaStaff (page 419).

2.2.115 Repeat_acknowledge_engraver

This engraver augments repeatCommands with start-repeat and end-repeat entries based on received events. This is internal behavior that allows simplifying other engravers that must support both \repeat volta and manual repeats.

This engraver also resets repeatCommands at the beginning of each time step. This is user-facing behavior: it allows setting a value for the current time step simply with \set rather than requiring \once \set.

Music types accepted: volta-repeat-end-event (page 62), and volta-repeat-start-event (page 62),

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 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.116 Repeat_tie_engraver

Create repeat ties.

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

This engraver creates the following layout object(s): RepeatTie (page 688), and RepeatTieColumn (page 689).

Repeat_tie_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.117 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 690).

Rest_collision_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.118 Rest_engraver

Engrave rests.

Music types accepted: rest-event (page 58),

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 689).

`Rest_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 102), `DrumVoice` (page 123), `GregorianTranscriptionVoice` (page 160), `KievanVoice` (page 212), `MensuralVoice` (page 240), `PetrucciVoice` (page 270), `StandaloneRhythmVoice` (page 359), `TabVoice` (page 382), `VaticanaVoice` (page 434), and `Voice` (page 444).

2.2.119 Rhythmic_column_engraver

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

This engraver creates the following layout object(s): `NoteColumn` (page 669).

`Rhythmic_column_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 102), `DrumVoice` (page 123), `GregorianTranscriptionVoice` (page 160), `KievanVoice` (page 212), `MensuralVoice` (page 240), `PetrucciVoice` (page 270), `StandaloneRhythmVoice` (page 359), `TabVoice` (page 382), `VaticanaVoice` (page 434), and `Voice` (page 444).

2.2.120 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 692).

`Script_column_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 102), `DrumVoice` (page 123), `GregorianTranscriptionVoice` (page 160), `KievanVoice` (page 212), `MensuralVoice` (page 240), `PetrucciVoice` (page 270), `StandaloneRhythmVoice` (page 359), `TabVoice` (page 382), `VaticanaVoice` (page 434), and `Voice` (page 444).

2.2.121 Script_engraver

Handle note scripted articulations.

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

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 691).

`Script_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 102), `DrumVoice` (page 123), `Dynamics` (page 133), `GregorianTranscriptionVoice` (page 160), `KievanVoice` (page 212), `MensuralVoice` (page 240), `PetrucciVoice` (page 270), `StandaloneRhythmVoice` (page 359), `TabVoice` (page 382), `VaticanaVoice` (page 434), and `Voice` (page 444).

2.2.122 Script_row_engraver

Determine order in horizontal side position elements.

This engraver creates the following layout object(s): `ScriptRow` (page 693).

`Script_row_engraver` is part of the following context(s) in `\layout`: `DrumStaff` (page 113), `GregorianTranscriptionStaff` (page 147), `InternalGregorianStaff` (page 171), `InternalMensuralStaff` (page 184), `KievanStaff` (page 198), `MensuralStaff` (page 225), `PetrucciStaff` (page 255), `Staff` (page 314), `TabStaff` (page 370), and `VaticanaStaff` (page 419).

2.2.123 Separating_line_group_engraver

Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

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

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

Separating_line_group_engraver is part of the following context(s) in \layout: ChordNames (page 100), DrumStaff (page 113), FiguredBass (page 138), FretBoards (page 140), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), NoteNames (page 250), PetrucciStaff (page 255), RhythmicStaff (page 283), Staff (page 314), StandaloneRhythmStaff (page 353), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.124 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 587), and ControlPolygon (page 588).

Show_control_points_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.125 Signum_repetitionis_engraver

Create a SignumRepetitionis at the end of a \repeat volta section.

Music types accepted: volta-repeat-end-event (page 62),

This engraver creates the following layout object(s): SignumRepetitionis (page 697).

Signum_repetitionis_engraver is part of the following context(s) in \layout: InternalMensuralStaff (page 184), MensuralStaff (page 225), and PetrucciStaff (page 255).

2.2.126 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 708).

Skip_typesetting_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.127 Slash_repeat_engraver

Make beat repeats.

Music types accepted: repeat-slash-event (page 58),

This engraver creates the following layout object(s): DoubleRepeatSlash (page 604), and RepeatSlash (page 687).

Slash_repeat_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.128 Slur_engraver

Build slur grobs from slur events.

Music types accepted: note-event (page 56), and slur-event (page 59),

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 700).

Slur_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), NullVoice (page 252), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), and Voice (page 444).

2.2.129 Slur_performer

Music types accepted: slur-event (page 59),

Slur_performer is part of the following context(s) in \midi: ChordNames (page 100), CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), NullVoice (page 252), PetrucciVoice (page 270), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.130 Spacing_engraver

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

Music types accepted: spacing-section-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.).

proportionalNotationDuration (non-negative exact rational or +inf.0)
: Global override for shortest-playing duration. This is used for switching on proportional notation.

This engraver creates the following layout object(s): SpacingSpanner (page 705).

Spacing_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.131 Span_arpeggio_engraver

Make arpeggios, non-arpeggiato brackets, and vertical slurs spanning multiple staves.

Properties (read)

`connectArpeggios` (boolean)
: If set, connect arpeggios across piano staff.

`connectChordBrackets` (boolean)
: If set, connect chord brackets across piano staff.

`connectChordSlurs` (boolean)
: If set, connect chord slurs across piano staff.

This engraver creates the following layout object(s): `Arpeggio` (page 544), `ChordBracket` (page 572), and `ChordSlur` (page 574).

`Span_arpeggio_engraver` is part of the following context(s) in `\layout`: `ChoirStaff` (page 69), `GrandStaff` (page 142), `PianoStaff` (page 281), and `StaffGroup` (page 327).

2.2.132 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 706).

`Span_bar_engraver` is part of the following context(s) in `\layout`: `GrandStaff` (page 142), `PianoStaff` (page 281), and `StaffGroup` (page 327).

2.2.133 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 707).

`Span_bar_stub_engraver` is part of the following context(s) in `\layout`: `ChoirStaff` (page 69), `GrandStaff` (page 142), `PianoStaff` (page 281), and `StaffGroup` (page 327).

2.2.134 Span_stem_engraver

Connect cross-staff stems to the stems above in the system

This engraver creates the following layout object(s): `Stem` (page 715).

`Span_stem_engraver` is not part of any context

2.2.135 Spanner_break_forbid_engraver

Forbid breaks in certain spanners.

`Spanner_break_forbid_engraver` is part of the following context(s) in `\layout`: `CueVoice` (page 102), `DrumVoice` (page 123), `GregorianTranscriptionVoice` (page 160), `KievanVoice` (page 212), `MensuralVoice` (page 240), `PetrucciVoice` (page 270), `StandaloneRhythmVoice` (page 359), `TabVoice` (page 382), `VaticanaVoice` (page 434), and `Voice` (page 444).

2.2.136 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 77), `Score` (page 289), `StandaloneRhythmScore` (page 329), and `VaticanaScore` (page 396).

2.2.137 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 77), DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), Score (page 289), Staff (page 314), StandaloneRhythmScore (page 329), TabStaff (page 370), VaticanaScore (page 396), and VaticanaStaff (page 419).

2.2.138 Staff_highlight_engraver

Highlights music passages.

Music types accepted: staff-highlight-event (page 59),

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 711).

Staff_highlight_engraver is part of the following context(s) in \layout: DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), RhythmicStaff (page 283), Staff (page 314), StandaloneRhythmStaff (page 353), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.139 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 71), ChordNames (page 100), DrumStaff (page 113), GregorianTranscriptionLyrics (page 144), GregorianTranscriptionStaff (page 147), KievanStaff (page 198), Lyrics (page 223), MensuralStaff (page 225), NoteNames (page 250), PetrucciStaff (page 255), RhythmicStaff (page 283), Staff (page 314), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.140 Staff_symbol_engraver

Create the constellation of five (default) staff lines.

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

This engraver creates the following layout object(s): StaffSymbol (page 713).

Staff_symbol_engraver is part of the following context(s) in \layout: ChordGrid (page 71), DrumStaff (page 113), GregorianTranscriptionStaff (page 147), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), KievanStaff (page 198), MensuralStaff (page 225), PetrucciStaff (page 255), RhythmicStaff (page 283), Staff (page 314), StandaloneRhythmStaff (page 353), TabStaff (page 370), and VaticanaStaff (page 419).

2.2.141 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 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.142 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 714).

Stanza_number_engraver is part of the following context(s) in \layout: GregorianTranscriptionLyrics (page 144), Lyrics (page 223), and VaticanaLyrics (page 393).

2.2.143 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 61),

Properties (read)

currentBarLine (graphical (layout) object)
: Set to the BarLine that Bar_engraver has created in the current time step.

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 617), Stem (page 715), StemStub (page 717), and StemTremolo (page 717).

Stem_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), and Voice (page 444).

2.2.144 System_start_delimiter_engraver

Create a system start delimiter (i.e., a SystemStartBar, SystemStartBrace, SystemStartBracket or SystemStartSquare spanner).

Properties (read)

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

systemStartDelimiter (symbol)
: Which grob to make for the start of the system/staff? Set to SystemStartBrace, SystemStartBracket or SystemStartBar.

systemStartDelimiterHierarchy (pair)
: A nested list, indicating the nesting of a start delimiters.

This engraver creates the following layout object(s): SystemStartBar (page 725), SystemStartBrace (page 726), SystemStartBracket (page 727), and SystemStartSquare (page 728).

System_start_delimiter_engraver is part of the following context(s) in \layout: ChoirStaff (page 69), ChordGrid (page 71), GrandStaff (page 142), PianoStaff (page 281), Score (page 289), StaffGroup (page 327), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.145 Tab_note_heads_engraver

Generate one or more tablature note heads from event of type NoteEvent.

Music types accepted: fingering-event (page 54), note-event (page 56), and string-number-event (page 60),

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 729).

`Tab_note_heads_engraver` is part of the following context(s) in `\layout`: `TabVoice` (page 382).

2.2.146 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 713).

`Tab_staff_symbol_engraver` is part of the following context(s) in `\layout`: `TabStaff` (page 370).

2.2.147 Tab_tie_follow_engraver

Adjust `TabNoteHead` properties when the `TabNoteHead` holds a `RepeatTie`, when a `Tie` ends and when a `Slur` or `Glissando` starts at a tied `TabNoteHead`.

Properties (read)

`tabFullNotation` (boolean)
: Flag whether `\tabFullNotation` is used

`Tab_tie_follow_engraver` is part of the following context(s) in `\layout`: `TabVoice` (page 382).

2.2.148 Tempo_performer

Music types accepted: `tempo-change-event` (page 61),

Properties (read)

`tempoWholesPerMinute` (positive exact rational or +inf.0)
: The tempo in whole notes per minute.

`Tempo_performer` is part of the following context(s) in `\midi`: `ChordGridScore` (page 77), and `Score` (page 289).

2.2.149 Text_engraver

Create text scripts.

Music types accepted: text-script-event (page 61),

This engraver creates the following layout object(s): TextScript (page 733).

Text_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), Dynamics (page 133), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.150 Text_mark_engraver

Engraves arbitrary textual marks.

Music types accepted: text-mark-event (page 61),

Properties (read)

stavesFound (list of grobs)
: A list of all staff-symbols found.

This engraver creates the following layout object(s): TextMark (page 731).

Text_mark_engraver is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.151 Text_spanner_engraver

Create text spanner from an event.

Music types accepted: text-span-event (page 61),

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 735).

Text_spanner_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), Dynamics (page 133), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), and Voice (page 444).

2.2.152 Tie_engraver

Generate ties between note heads of equal pitch.

Music types accepted: tie-event (page 61),

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 737), and TieColumn (page 739).

Tie_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), NoteNames (page 250), NullVoice (page 252), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.153 Tie_performer

Generate ties between note heads of equal pitch.

Music types accepted: tie-event (page 61),

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 100), CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), NullVoice (page 252), PetrucciVoice (page 270), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.154 Time_signature_engraver

Create a TimeSignature (page 739), whenever timeSignature changes.

Music types accepted: polymetric-time-signature-event (page 58), and reference-time-signature-event (page 58),

Properties (read)

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

partialBusy (boolean)
: Signal that \partial acts at the current time step.

timeSignature (time signature)
: A time-signature specification. See the \time command.

This engraver creates the following layout object(s): TimeSignature (page 739).

Time_signature_engraver is part of the following context(s) in \layout: DrumStaff (page 113), InternalGregorianStaff (page 171), InternalMensuralStaff (page 184), MensuralStaff (page 225), PetrucciStaff (page 255), RhythmicStaff (page 283), Staff (page 314), and TabStaff (page 370).

2.2.155 Time_signature_performer

Creates a MIDI time signature whenever timeSignature changes or a \time command is issued.

Music types accepted: reference-time-signature-event (page 58),

Properties (read)

timeSignature (time signature)
: A time-signature specification. See the \time command.

Time_signature_performer is part of the following context(s) in \midi: ChordGridScore (page 77), and Score (page 289).

2.2.156 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 51), bar-check-event (page 51), bar-event (page 51), fine-event (page 53), partial-event (page 57), and polymetric-time-signature-event (page 58),

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.

beatBase (positive exact rational or +inf.0)
: The musical length corresponding to one unit of beatStructure.

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 exact rational or +inf.0)
: The musical length of the current measure.

measurePosition (moment)
: The current point within the measure.

timeSignature (time signature)
: A time-signature specification. See the \time command.

Properties (write)

alternativeNumber (non-negative, exact integer)
: When set, the first volta number for the current \alternative element. Not set outside of alternatives.

beatBase (positive exact rational or +inf.0)
: The musical length corresponding to one unit of beatStructure.

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 exact rational or +inf.0)
: The musical length of the current measure.

measurePosition (moment)
: The current point within the measure.

measureStartNow (boolean)
: True at the beginning of a measure.

timeSignature (time signature)
: A time-signature specification. See the \time command.

Timing_translator is part of the following context(s) in \layout: ChordGridScore (page 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396); in \midi: ChordGridScore (page 77), and Score (page 289).

2.2.157 Toe_heel_engraver

Read the toeHeelStyle context property and use it to style \rtoe and its siblings, based on the data in the toe-heel-styles alist.

Music types accepted: articulation-event (page 51),

Properties (read)

toeHeelStyle (symbol)
: The style for the glyph shape and behavior of \rtoe and siblings. Possible values are default, standard, reversed, circleheels, and below. If not set (the default), use value default.

Toe_heel_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), Dynamics (page 133), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.158 Trill_spanner_engraver

Create trill spanners.

Music types accepted: trill-span-event (page 61),

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 746).

Trill_spanner_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.159 Tuplet_engraver

Catch tuplet events and generate appropriate bracket.

Music types accepted: tuplet-span-event (page 62),

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 747), and TupletNumber (page 749).

Tuplet_engraver is part of the following context(s) in \layout: CueVoice (page 102), DrumVoice (page 123), GregorianTranscriptionVoice (page 160), KievanVoice (page 212), MensuralVoice (page 240), PetrucciVoice (page 270), StandaloneRhythmVoice (page 359), TabVoice (page 382), VaticanaVoice (page 434), and Voice (page 444).

2.2.160 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 77), Score (page 289), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.161 Vaticana_ligature_engraver

Handle ligatures by glueing special ligature heads together.

Music types accepted: ligature-event (page 55), and pes-or-flexa-event (page 57),

This engraver creates the following layout object(s): DotColumn (page 600), and VaticanaLigature (page 753).

Vaticana_ligature_engraver is part of the following context(s) in \layout: VaticanaVoice (page 434).

2.2.162 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 710), and VerticalAlignment (page 753).

Vertical_align_engraver is part of the following context(s) in \layout: ChoirStaff (page 69), ChordGridScore (page 77), GrandStaff (page 142), PianoStaff (page 281), Score (page 289), StaffGroup (page 327), StandaloneRhythmScore (page 329), and VaticanaScore (page 396).

2.2.163 Volta_engraver

Make volta brackets.

Music types accepted: dal-segno-event (page 53), fine-event (page 53), and volta-span-event (page 62),

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.

This engraver creates the following layout object(s): `VoltaBracket` (page 757), and `VoltaBracketSpanner` (page 758).

`Volta_engraver` is part of the following context(s) in `\layout`: `ChordGridScore` (page 77), `Score` (page 289), `StandaloneRhythmScore` (page 329), and `VaticanaScore` (page 396).

2.3 Tunable context properties

`accidentalGrouping` (symbol)
: If set to `'voice`, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

`additionalBassStrings` (list)
: The additional tablature bass-strings, which will not get a separate line in `TabStaff`. It is a list of the pitches of each string (starting with the lowest numbered one).

`additionalPitchPrefix` (string)
: Text with which to prefix additional pitches within a chord name.

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

`alignAboveContext` (string)
: Where to insert newly created context in vertical alignment.

`alignBelowContext` (string)
: Where to insert newly created context in vertical alignment.

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

`alternativeNumber` (non-negative, exact integer)
: When set, the first volta number for the current `\alternative` element. Not set outside of alternatives.

`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.

`autoExtenders` (boolean)
: Create lyric extenders automatically for syllables in melismata that are not followed by a hyphen.

`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.

beamExceptions (list)
: An alist of exceptions to auto-beam 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.

beamMaximumSubdivision (non-negative exact rational or +inf.0)
: Maximum interval to subdivide beams, limiting the depth of beamlets removed from subdivision. Ranges from 0 to infinity (0=no subdivision, +inf.0=no limit).

beamMinimumSubdivision (non-negative exact rational or +inf.0)
: 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).

beatBase (positive exact rational or +inf.0)
: The musical length corresponding to one unit of beatStructure.

beatExtraVelocity (integer)
: Extra MIDI velocity added by the 'Beat_performer' at the start of each beat.

beatStructure (number list)
: A sequence describing the length of each beat in the measure in units of beatBase.

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 exact rational or +inf.0)
Sub-bar unit of completion.

`connectArpeggios` (boolean)
If set, connect arpeggios across piano staff.

`connectChordBrackets` (boolean)
If set, connect chord brackets across piano staff.

`connectChordSlurs` (boolean)
If set, connect chord slurs 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 '`:|.S.|:`'.

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

`drumPitchTable` (hash table)
: A table mapping percussion instruments (symbols) to pitches.

`drumStyleTable` (hash table)
: A hash table which maps drums to layout settings. Predefined values: '`drums-style`', '`agostini-drums-style`', '`weinberg-drums-style`', '`timbales-style`', '`congas-style`', '`bongos-style`', and '`percussion-style`'.

  The layout style is a hash table, containing the drum-pitches (e.g., the symbol '`hihat`') as keys, and a list (*`notehead-style script vertical-position`*) as values.

`endAtSkip` (boolean)
: End `DurationLine` grob on `skip-event`

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

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

`explicitClefVisibility` (vector)
'`break-visibility`' function for clef changes.

`explicitCueClefVisibility` (vector)
'`break-visibility`' function for cue clef changes.

`explicitKeySignatureVisibility` (vector)
'`break-visibility`' function for explicit key changes. '`\override`' of the `break-visibility` property will set the visibility for normal (i.e., at the start of the line) key signatures.

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

`extraNatural` (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`figuredBassAlterationDirection` (direction)
Where to put alterations relative to the main figure.

`figuredBassCenterContinuations` (boolean)
Whether to vertically center pairs of extender lines. This does not work with three or more lines.

`figuredBassFormatter` (procedure)
A routine generating a markup for a bass figure.

`figuredBassLargeNumberAlignment` (number)
Horizontal alignment to use for numbers in figured bass that contain more than a single digit.

`figuredBassPlusDirection` (direction)
Where to put plus signs relative to the main figure.

`figuredBassPlusStrokedAlist` (list)
An alist mapping figured bass digits to glyphs. The default is mapping numbers 2, 4, 5, 6, 7, and 9 to the six glyphs `figbass.*plus` and `figbass.*stroked`, respectively.

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

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

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

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

`fineText` (markup)
The text to print at `\fine`.

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

`firstClef` (boolean)
If true, create a new clef when starting a staff.

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

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

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

`forbidBreakBetweenBarLines` (boolean)
If set to `#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 `'()` defaults to `'((0 . 0) (1 . 1) ... (n . n))`, where *n* is the minimum number of note heads in the two note columns between which the glissandi occur.

`gridInterval` (positive exact rational or +inf.0)
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?

`maximumFretStretch` (number)
: Don't allocate frets further than this from specified frets.

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

`measureLength` (positive exact rational or +inf.0)
The musical length of the current measure.

`melismaBusyProperties` (list)
A list of properties (symbols) to determine whether a melisma is playing. Setting this property will influence how lyrics are aligned to notes. For example, if set to `'(melismaBusy beamMelismaBusy)`, only manual melismata and manual beams are considered. Possible values include `melismaBusy`, `slurMelismaBusy`, `tieMelismaBusy`, and `beamMelismaBusy`.

`metronomeMarkFormatter` (procedure)
How to produce a metronome markup. Called with two arguments: a `TempoChangeEvent` and context.

`middleCClefPosition` (number)
The position of the middle C, as determined only by the clef. This can be calculated by looking at `clefPosition` and `clefGlyph`.

`middleCCuePosition` (number)
The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at `cueClefPosition` and `cueClefGlyph`.

`middleCOffset` (number)
The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

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

`midiBalance` (number)
Stereo balance for the MIDI channel associated with the current context. Ranges from -1 to 1, where the values -1 (`#LEFT`), 0 (`#CENTER`) and 1 (`#RIGHT`) correspond to leftmost emphasis, center balance, and rightmost emphasis, respectively.

`midiChannelMapping` (symbol)
How to map MIDI channels: per `staff` (default), `instrument` or `voice`.

`midiChorusLevel` (number)
Chorus effect level for the MIDI channel associated with the current context. Ranges from 0 to 1 (0=off, 1=full effect).

`midiExpression` (number)
Expression control for the MIDI channel associated with the current context. Ranges from 0 to 1 (0=off, 1=full effect).

`midiInstrument` (string)
Name of the MIDI instrument to use.

`midiMaximumVolume` (number)
Analogous to `midiMinimumVolume`.

`midiMergeUnisons` (boolean)
If true, output only one MIDI note-on event when notes with the same pitch, in the same MIDI-file track, overlap.

`midiMinimumVolume` (number)
Set the minimum loudness for MIDI. Ranges from 0 to 1.

`midiPanPosition` (number)
: Pan position for the MIDI channel associated with the current context. Ranges from -1 to 1, where the values -1 (`#LEFT`), 0 (`#CENTER`) and 1 (`#RIGHT`) correspond to hard left, center, and hard right, respectively.

`midiReverbLevel` (number)
: Reverb effect level for the MIDI channel associated with the current context. Ranges from 0 to 1 (0=off, 1=full effect).

`minimumFret` (number)
: The tablature auto string-selecting mechanism selects the highest string with a fret at least `minimumFret`.

`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.

`pageTurnMinimumRepeatLength` (non-negative exact rational or +inf.0)
: Minimum length of a repeated section for a page turn to be allowed within that section.

`pageTurnMinimumRestLength` (non-negative exact rational or +inf.0)
: Minimum length of a rest for a page turn to be allowed.

`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` (non-negative exact rational or +inf.0)
: 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 multi-measure 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 multi-measure notes and rests. These bars will not appear on the printed output. If not set (the default), multi-measure 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 `beamMaximumSubdivision`, between beats at multiples of `beamMinimumSubdivision`.

`submeasureBarType` (string)
: Bar line to insert at submeasure boundaries specified by `submeasureStructure`, when `submeasureBarsEnabled` allows.

`submeasureStructure` (number list)
: A sequence describing subdivisions of a measure. Each element tells the distance from the previous division in units of `beatBase`.

`suggestAccidentals` (boolean or symbol)
: If set to `#t`, accidentals are typeset as suggestions above the note. Setting it to `'cautionary` only applies that to cautionary accidentals.

`supportNonIntegerFret` (boolean)
: If set in `Score` the `TabStaff` will print micro-tones as '$2\frac{1}{2}$'

`suspendMelodyDecisions` (boolean)
: When using the `Melody_engraver`, stop changing orientation of stems based on the melody when this is set to `#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.

`tabFullNotation` (boolean)
: Flag whether `\tabFullNotation` is used

`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.

`tempoCountPrecision` (a positive, exact rational number)
: Rounding precision for metronome rate. Readers should use 1 as the default when this property is not set.

`tempoHideNote` (boolean)
: Hide the note = count in tempo marks.

`tempoWholesPerMinute` (positive exact rational or +inf.0)
: 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.

`timeSignature` (time signature)
: A time-signature specification. See the `\time` command.

`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 `beatBase`, `beatStructure`, and `beamExceptions`.

`timing` (boolean)
: Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

`toeHeelStyle` (symbol)
: The style for the glyph shape and behavior of `\rtoe` and siblings. Possible values are `default`, `standard`, `reversed`, `circleheels`, and `below`. If not set (the default), use value `default`.

`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 exact rational or +inf.0)
: Normally, a tuplet bracket is as wide as the `\times` expression that gave rise to it. This property can shorten the bracket.

```
{
  \set tupletSpannerDuration = #1/4
  \times 2/3 { c8 c c c c c }
}
```

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

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

`vocalName` (markup)
: Name of a vocal line.

`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 time step in which a coda mark appears: not set during the first time step, 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 time step.

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.

deprecatedBarCheckSynchronize (boolean)
: If true then reset measurePosition when finding a bar check.

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.

`measurePosition` (moment)
: The current point within the measure.

`measureStartNow` (boolean)
: True at the beginning of a measure.

`melismaBusy` (boolean)
: Signifies whether a melisma is active. This can be used to signal melismata on top of those automatically detected.

`meterScalingFactor` (number)
: The factor by which local nominal time signature settings must be scaled to fit the measure defined in the `Timing` context. This must not be set in the `Timing` context. Readers should use 1 as the default when this property is not set.

`midiSkipOffset` (moment)
: This is the accrued MIDI offset to account for time skipped via `skipTypesetting`.

`partialBusy` (boolean)
: Signal that \partial acts at the current time step.

`propertyStacks` (association list (list of pairs))
: An alist used by `\pushContextProperty` and `\popContextProperty` to emulate a context property stack. Each element of a stack is a list: either an empty list representing the unset state or a one-element list holding the value for the set state.

`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 time step in which a segno appears: not set during the first time step, 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

`submeasureBarsEnabled` (boolean)
: Whether to insert submeasure bar lines at boundaries specified by `submeasureStructure`. They are typically enabled selectively to clarify complex rhythms.

`tieMelismaBusy` (boolean)
: Signal whether a tie is present.

`voltaBracketMusicalLength` (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.

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 535), grob.

Accidental objects are created by the following engraver(s): Accidental_engraver (page 455).

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 ly:accidental-interface::horizontal-skylines >

Two skylines, one to the left and one to the right of this grob.

stencil (stencil):
ly:accidental-interface::print

The symbol to print.

vertical-skylines (pair of skylines):
#<unpure-pure-container ly:grob::vertical-skylines-from-stencil 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 761), `accidental-switch-interface` (page 762), `font-interface` (page 787), `grob-interface` (page 793), `inline-accidental-interface` (page 800), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.2 AccidentalCautionary

A cautionary accidental, normally enclosed in parentheses.

`AccidentalCautionary` objects are created by the following engraver(s): `Accidental_engraver` (page 455).

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 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 ly:grob::vertical-skylines-from-stencil 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 829).

Y-extent (pair of numbers):
#<unpure-pure-container 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 761), accidental-switch-interface (page 762), font-interface (page 787), grob-interface (page 793), inline-accidental-interface (page 800), and item-interface (page 802).

This object is of class Item (characterized by item-interface (page 802)).

3.1.3 AccidentalPlacement

In groups of Accidental (page 533), 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 455), and Ambitus_engraver (page 456).

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 762), `grob-interface` (page 793), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

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 455).

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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): accidental-interface (page 761), accidental-suggestion-interface (page 762), accidental-switch-interface (page 762), font-interface (page 787), grob-interface (page 793), item-interface (page 802), outside-staff-interface (page 822), script-interface (page 827), self-alignment-interface (page 829), and side-position-interface (page 832).

This object is of class Item (characterized by item-interface (page 802)).

3.1.5 Ambitus

An ambitus, giving the range of pitches of a voice or instrument. It aligns AmbitusAccidental (page 540), AmbitusLine (page 540), and AmbitusNoteHead (page 541), horizontally and defines the horizontal spacing from the ambitus to other items.

Ambitus objects are created by the following engraver(s): Ambitus_engraver (page 456).

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)
  (optional-material-end-bracket extra-space . 1.0)
  (optional-material-start-bracket extra-space . 1.0)
  (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 "Grobs and their break-align symbols" in *Notation 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 ly:axis-group-interface::height ly:axis-group-interface::pure-height >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `ambitus-interface` (page 763), `axis-group-interface` (page 764), `break-aligned-interface` (page 774), `grob-interface` (page 793), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.6 AmbitusAccidental

An accidental in an `Ambitus` (page 538).

`AmbitusAccidental` objects are created by the following engraver(s): `Ambitus_engraver` (page 456).

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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 761), `accidental-switch-interface` (page 762), `break-aligned-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.7 AmbitusLine

The vertical line in an `Ambitus` (page 538).

`AmbitusLine` objects are created by the following engraver(s): `Ambitus_engraver` (page 456).

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 829).

This object supports the following interface(s): `ambitus-interface` (page 763), `font-interface` (page 787), `grob-interface` (page 793), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.8 AmbitusNoteHead

A note head in an `Ambitus` (page 538).

`AmbitusNoteHead` objects are created by the following engraver(s): `Ambitus_engraver` (page 456).

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 note head for ambitus calculation.

`stencil` (stencil):
`ly:note-head::print`

The symbol to print.

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 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 829).

This object supports the following interface(s): `ambitus-interface` (page 763), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `ledgered-interface` (page 806), `note-head-interface` (page 818), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.9 ApproximatePitchNoteHead

A note head for a pitch that cannot be notated with certainty. See also `NoteHead` (page 670).

`ApproximatePitchNoteHead` objects are created by the following engraver(s): `Note_heads_engraver` (page 494).

Standard settings:

`bend-me` (boolean):
`'()`

Decide whether this grob is bent.

`direction` (direction):
`approximate-pitch-note-head::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`.

`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.

`no-ledgers` (boolean):
`#t`

If set, don't draw ledger lines on this object.

`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 note head. Each component is measured in a -1 to 1 scale so that -1 is the left/bottom edge of the note's bounding box and 1 is the right/top edge.

`stencil` (stencil):
`ly:note-head::print`

The symbol to print.

`style` (symbol):
`'arrow`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 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 829).

Remarks:

- An example is the highest note the singer can sing. The notated pitch shows the rough expectation. By default, this head is triangular and has no ledger lines.

This object supports the following interface(s): `accidental-participating-head-interface` (page 762), `bend-interface` (page 772), `font-interface` (page 787), `gregorian-ligature-interface` (page 791), `grob-interface` (page 793), `item-interface` (page 802), `ledgered-interface` (page 806), `ligature-head-interface` (page 807), `mensural-ligature-interface` (page 813), `note-head-interface` (page 818), `rhythmic-grob-interface` (page 826), `rhythmic-head-interface` (page 827),

staff-symbol-referencer-interface (page 843), and vaticana-ligature-interface (page 859).

This object is of class Item (characterized by item-interface (page 802)).

3.1.10 Arpeggio

An arpeggio line (normally a vertical wiggle). See also ChordBracket (page 572), and ChordSlur (page 574).

Arpeggio objects are created by the following engraver(s): Arpeggio_engraver (page 457), and Span_arpeggio_engraver (page 504).

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 a bracket indicating non-arpeggio or optional material, 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container ly:grob::stencil-height 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 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 829).

This object supports the following interface(s): `arpeggio-interface` (page 764), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `side-position-interface` (page 832), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.11 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 459).

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):
`#<program>`

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):
`#<program>`

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 ly:grob::vertical-skylines-from-stencil 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):
`#<program>`

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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container ly:grob::stencil-height 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):
`#<program>`

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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `balloon-interface` (page 766), `font-interface` (page 787), `grob-interface` (page 793), `sticky-grob-interface` (page 846), and `text-interface` (page 850).

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 802), and `spanner-interface` (page 840).

3.1.12 BarLine

A bar line.

`BarLine` objects are created by the following engraver(s): `Bar_engraver` (page 459).

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):
`#<program>`

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 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)
  (optional-material-end-bracket extra-space . 1.0)
  (optional-material-start-bracket 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 "Grobs and their break-align symbols" in *Notation 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 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 767), `break-aligned-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), and `pure-from-neighbor-interface` (page 825).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.13 BarNumber

An ordinary bar number. Centered bar numbers are managed separately with `CenteredBarNumber` (page 569), grobs.

`BarNumber` objects are created by the following engraver(s): `Bar_number_engraver` (page 461).

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 "Grobs and their break-align symbols" in *Notation 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):
#<program>

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 829).

Y-extent (pair of numbers):
#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): bar-number-interface (page 769), break-alignable-interface (page 774), font-interface (page 787), grob-interface (page 793), item-interface (page 802), outside-staff-interface (page 822),

self-alignment-interface (page 829), side-position-interface (page 832), and text-interface (page 850).

This object is of class Item (characterized by item-interface (page 802)).

3.1.14 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 477).

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 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 762), bass-figure-interface (page 769), font-interface (page 787), grob-interface (page 793), item-interface (page 802), rhythmic-grob-interface (page 826), and text-interface (page 850).

This object is of class Item (characterized by item-interface (page 802)).

3.1.15 BassFigureAlignment

An auxiliary grob to stack several BassFigureLine (page 556), grobs vertically.

BassFigureAlignment objects are created by the following engraver(s): Figured_bass_engraver (page 477).

Standard settings:

axes (list):
'(1)

List of axis numbers. In the case of alignment grobs, this should contain only one number.

padding (dimension, in staff space):
-inf.0

Add this much extra space between objects that are next to each other.

stacking-dir (direction):
-1

Stack objects in which direction?

vertical-skylines (pair of skylines):
ly:axis-group-interface::calc-skylines

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container ly:axis-group-interface::height ly:axis-group-interface::pure-height >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `align-interface` (page 763), `axis-group-interface` (page 764), `bass-figure-alignment-interface` (page 769), `grob-interface` (page 793), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.16 BassFigureAlignmentPositioning

If figured bass is used in the `Staff` (page 314), 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 477).

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):
#<unpure-pure-container ly:axis-group-interface::height ly:axis-group-interface::pure-height >

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

Y-offset (number):
#<unpure-pure-container ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): axis-group-interface (page 764), grob-interface (page 793), outside-staff-interface (page 822), side-position-interface (page 832), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.17 BassFigureBracket

Brackets around a figured bass (or elements of it).

BassFigureBracket objects are created by the following engraver(s): Figured_bass_engraver (page 477).

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 784), grob-interface (page 793), and item-interface (page 802).

This object is of class Item (characterized by item-interface (page 802)).

3.1.18 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 477).

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 829).

This object supports the following interface(s): figured-bass-continuation-interface (page 785), grob-interface (page 793), horizontal-line-spanner-interface (page 799), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.19 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 477).

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 ly:axis-group-interface::height ly:axis-group-interface::pure-height >

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): axis-group-interface (page 764), grob-interface (page 793), outside-staff-axis-group-interface (page 821), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.20 Beam

A beam.

Beam objects are created by the following engraver(s): Auto_beam_engraver (page 457), Beam_engraver (page 463), Chord_tremolo_engraver (page 468), Grace_auto_beam_engraver (page 480), and Grace_beam_engraver (page 480).

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)
  (over-beam-height . 0.75)
  (region-size . 2)
  (round-to-zero-slope . 0.02)
  (secondary-beam-demerit . 10)
  (slash-slope . 2)
  (slash-side . -1)
  (slash-stem-fraction . 0.3)
  (slash-thickness . 0.1)
  (slash-X-positions -0.5 . 1)
  (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 533, 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 761, 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 note heads.

`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):
`#<program>`

This makes the grob invisible.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container ly:grob::vertical-skylines-from-stencil 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 769), `grob-interface` (page 793), `spanner-interface` (page 840), `staff-symbol-referencer-interface` (page 843), and `unbreakable-spanner-interface` (page 859).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.21 BendAfter

A grob for displaying *falls* and *doits*.

`BendAfter` objects are created by the following engraver(s): `Bend_engraver` (page 465).

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 note heads.

`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 772), `grob-interface` (page 793), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.22 BendSpanner

A string bending as used in tablature notation.

BendSpanner objects are created by the following engraver(s): Bend_spanner_engraver (page 465).

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 . #<program>)
  (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 533, 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 761, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob's description section.

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).

font-size (number):
-2
The font size, compared to the 'normal' size. 0 is style-sheet's normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

padding (dimension, in staff space):
0.15
Add this much extra space between objects that are next to each other.

side-axis (number):
1
If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

spanner-id (index or symbol):
""
An identifier to distinguish concurrent spanners.

stencil (stencil):
bend-spanner::print
The symbol to print.

style (symbol):
'()
This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

text (markup):
#f
Text markup. See Section "Formatting text" in *Notation Reference*.

thickness (number):
1
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *Staff*.StaffSymbol.thickness).

vertical-skylines (pair of skylines):
#<unpure-pure-container ly:grob::vertical-skylines-from-stencil 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 829).

This object supports the following interface(s): `bend-interface` (page 772), `font-interface` (page 787), `grob-interface` (page 793), `line-spanner-interface` (page 808), `outside-staff-interface` (page 822), `spanner-interface` (page 840), `text-interface` (page 850), and `text-script-interface` (page 851).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.23 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 564).

`BreakAlignGroup` objects are created by the following engraver(s): `Break_align_engraver` (page 465).

Standard settings:

`axes` (list):
`'(0)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`break-align-anchor` (number):
`ly:break-aligned-interface::calc-average-anchor`

Grobs aligned to this breakable item will have their X-offsets shifted by this number. In bar lines, for example, this is used to position grobs relative to the (visual) center of the bar line.

`break-align-anchor-alignment` (number):
`ly:break-aligned-interface::calc-joint-anchor-alignment`

Read by `ly:break-aligned-interface::calc-extent-aligned-anchor` for aligning an anchor to a grob's extent.

`break-visibility` (vector):
`ly:break-aligned-interface::calc-break-visibility`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 764), `break-aligned-interface` (page 774), `grob-interface` (page 793), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.24 BreakAlignment

An auxiliary grob that manages the horizontal ordering of BreakAlignGroup (page 563), grobs within a NonMusicalPaperColumn (page 667), 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 465).

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):

```
#((staff-ellipsis
   left-edge
   cue-end-clef
   ambitus
   breathing-sign
   optional-material-end-bracket
   signum-repetitionis
   clef
   cue-clef
   staff-bar
   key-cancellation
   key-signature
   time-signature
   optional-material-start-bracket
   custos)
  (staff-ellipsis
   left-edge
   optional-material-end-bracket
   cue-end-clef
   ambitus
   breathing-sign
   signum-repetitionis
   clef
   cue-clef
   staff-bar
   key-cancellation
   key-signature
   time-signature
   optional-material-start-bracket
   custos)
  (staff-ellipsis
   left-edge
   optional-material-end-bracket
   ambitus
   breathing-sign
   signum-repetitionis
   clef
   key-cancellation
```

```
key-signature
time-signature
staff-bar
cue-clef
optional-material-start-bracket
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 "Grobs and their break-align symbols" in *Notation Reference* and 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))
```

The same result can be achieved more conveniently by:

```
\breakAlignInsert time-signature before clef
```

`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 764), `break-alignment-interface` (page 776), `grob-interface` (page 793), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.25 BreathingSign

A breathing sign.

`BreathingSign` objects are created by the following engraver(s): `Breathing_sign_engraver` (page 466), and `Caesura_engraver` (page 466).

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)
  (optional-material-end-bracket extra-space . 1.0)
  (optional-material-start-bracket extra-space . 1.0)
  (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 "Grobs and their break-align symbols" in *Notation 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 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 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 829).

This object supports the following interface(s): `break-aligned-interface` (page 774), `breathing-sign-interface` (page 776), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.26 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 466).

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 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `caesura-script-interface` (page 777), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), `script-interface` (page 827), `self-alignment-interface` (page 829), and `side-position-interface` (page 832).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.27 CenteredBarNumber

A centered bar number; see also `CenteredBarNumberLineSpanner` (page 570). Ordinary bar numbers are managed with `BarNumber` (page 551), grobs.

`CenteredBarNumber` objects are created by the following engraver(s): `Bar_number_engraver` (page 461).

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 829).

This object supports the following interface(s): `bar-number-interface` (page 769), `centered-bar-number-interface` (page 777), `centered-spanner-interface` (page 777), `font-interface` (page 787), `grob-interface` (page 793), `spanner-interface` (page 840), and `text-interface` (page 850).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.28 CenteredBarNumberLineSpanner

An auxiliary grob providing a vertical baseline to align `CenteredBarNumber` (page 569), grobs.

`CenteredBarNumberLineSpanner` objects are created by the following engraver(s): `Centered_bar_number_align_engraver` (page 467).

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 ly:grob::vertical-skylines-from-element-stencils 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 ly:axis-group-interface::height ly:axis-group-interface::pure-height >

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

Y-offset (number):
#<unpure-pure-container ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): axis-group-interface (page 764), bar-number-interface (page 769), centered-bar-number-line-spanner-interface (page 777), grob-interface (page 793), outside-staff-interface (page 822), side-position-interface (page 832), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.29 ChordBracket

A non-arpeggiato or non-divisi bracket. See also Arpeggio (page 544), and ChordSlur (page 574).

ChordBracket objects are created by the following engraver(s): Arpeggio_engraver (page 457), and Span_arpeggio_engraver (page 504).

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 a bracket indicating non-arpeggio or optional material, 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:chord-bracket::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:chord-bracket::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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container ly:grob::stencil-height 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 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 829).

This object supports the following interface(s): `chord-bracket-interface` (page 777), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `side-position-interface` (page 832), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.30 ChordName

A stand-alone chord name. For chord names in chord grids, see `GridChordName` (page 623).

`ChordName` objects are created by the following engraver(s): `Chord_name_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).

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):
#<unpure-pure-container 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 762), chord-name-interface (page 778), font-interface (page 787), grob-interface (page 793), item-interface (page 802), outside-staff-interface (page 822), rhythmic-grob-interface (page 826), and text-interface (page 850).

This object is of class Item (characterized by item-interface (page 802)).

3.1.31 ChordSlur

A vertical slur. See also Arpeggio (page 544), and ChordBracket (page 572).

ChordSlur objects are created by the following engraver(s): Arpeggio_engraver (page 457), and Span_arpeggio_engraver (page 504).

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 a bracket indicating non-arpeggio or optional material, 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:chord-slur::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:chord-slur::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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container ly:grob::stencil-height 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 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 829).

This object supports the following interface(s): `chord-slur-interface` (page 778), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `side-position-interface` (page 832), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.32 ChordSquare

In a chord grid, this grob represents one chord square. It helps place `GridChordName` (page 623), 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 713), and `BarLine` (page 547).

`ChordSquare` objects are created by the following engraver(s): `Chord_square_engraver` (page 467).

Standard settings:

`measure-division-chord-placement-alist` (association list (list of pairs)):

```
'(((1) (0 . 0))
  ((1/2 1/2) (-0.4 . 0.4) (0.4 . -0.4))
  ((1/2 1/4 1/4) (-0.4 . 0.4) (0 . -0.65) (0.63 . 0))
  ((1/4 1/4 1/2) (-0.63 . 0) (0 . 0.65) (0.4 . -0.4))
  ((1/4 1/4 1/4 1/4)
   (-0.63 . 0)
   (0 . 0.7)
   (0 . -0.65)
   (0.63 . 0))
  ((1/4 3/4) (-0.63 . 0) (0.38 . 0))
  ((3/4 1/4) (-0.38 . 0) (0.63 . 0)))
```

An alist mapping measure divisions (see the measure-division property) to lists of coordinates (number pairs) applied to the chord names of a chord square. Coordinates are normalized between -1 and 1 within the square.

measure-division-lines-alist (association list (list of pairs)):

```
'(((1))
  ((1/2 1/2) (-1 -1 1 1))
  ((1/2 1/4 1/4) (-1 -1 1 1) (0 0 1 -1))
  ((1/4 1/4 1/2) (-1 -1 1 1) (-1 1 0 0))
  ((1/4 1/4 1/4 1/4) (-1 -1 1 1) (-1 1 1 -1))
  ((1/4 3/4) (-1 -1 0 0) (-1 1 0 0))
  ((3/4 1/4) (0 0 1 -1) (0 0 1 1)))
```

An alist mapping measure divisions (see the measure-division property) to lists of lines to draw in the square, given as 4-element lists: *(x-start y-start x-end y-end)*.

stencil (stencil):

chord-square::print

The symbol to print.

X-extent (pair of numbers):

chord-square::width

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

Y-extent (pair of numbers):

#<unpure-pure-container chord-square::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-square-interface (page 779), grob-interface (page 793), line-interface (page 807), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.33 Clef

A clef. See also ClefModifier (page 580), CueClef (page 589), and CueEndClef (page 592).

Clef objects are created by the following engraver(s): Clef_engraver (page 468).

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)
  (ambitus extra-space . 1.15)
  (key-cancellation extra-space . 0.82)
  (key-signature extra-space . 0.82)
  (time-signature extra-space . 1.52)
  (optional-material-end-bracket extra-space . 1.0)
  (optional-material-start-bracket extra-space . 1.0)
  (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 "Grobs and their break-align symbols" in *Notation 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 ly:grob::vertical-skylines-from-stencil >`

Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 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 829).

This object supports the following interface(s): `break-aligned-interface` (page 774), `clef-interface` (page 780), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `pure-from-neighbor-interface` (page 825), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.34 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 577), `CueClef` (page 589), and `CueEndClef` (page 592).

`ClefModifier` objects are created by the following engraver(s): `Clef_engraver` (page 468), and `Cue_clef_engraver` (page 471).

Standard settings:

`break-visibility` (vector):
`#<program>`

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):
`#<program>`

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):
`#<program>`

This makes the grob invisible.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `clef-modifier-interface` (page 780), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.35 ClusterSpanner

A cluster spanner. The envelope shape within the spanner is given by ClusterSpannerBeacon (page 582), grobs.

ClusterSpanner objects are created by the following engraver(s): Cluster_spanner_engraver (page 469).

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 note heads.

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 780), grob-interface (page 793), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.36 ClusterSpannerBeacon

An auxiliary grob to specify the minimum and maximum pitch of a ClusterSpanner (page 582), grob at a given moment.

ClusterSpannerBeacon objects are created by the following engraver(s): Cluster_spanner_engraver (page 469).

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 780), grob-interface (page 793), item-interface (page 802), and rhythmic-grob-interface (page 826).

This object is of class Item (characterized by item-interface (page 802)).

3.1.37 CodaMark

A coda mark.

CodaMark objects are created by the following engraver(s): Mark_engraver (page 488).

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 "Grobs and their break-align symbols" in *Notation Reference*.

break-visibility (vector):
: #(#t #t #f)

  A vector of 3 booleans, #(*end-of-line unbroken begin-of-line*). #t means visible, #f means killed.

direction (direction):
: 1

  If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

extra-spacing-width (pair of numbers):
: '(+inf.0 . -inf.0)

  In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

font-size (number):
: 2

  The font size, compared to the 'normal' size. 0 is style-sheet's normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

non-musical (boolean):
: #t

  True if the grob belongs to a NonMusicalPaperColumn.

outside-staff-horizontal-padding (number):
: 0.2

  By default, an outside-staff-object can be placed so that is it very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

`outside-staff-padding` (number):
`0.4`

The padding to place between grobs when spacing according to `outside-staff-priority`. Two grobs with different `outside-staff-padding` values have the larger value of padding between them.

`outside-staff-priority` (number):
`1400`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`padding` (dimension, in staff space):
`0.4`

Add this much extra space between objects that are next to each other.

`self-alignment-X` (number):
`break-alignable-interface::self-alignment-opposite-of-anchor`

Specify alignment of an object. The value `-1` means left aligned, `0` centered, and `1` right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width. 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 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `break-alignable-interface` (page 774), `coda-mark-interface` (page 781), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `mark-interface` (page 811), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.38 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 496).

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 (or extralight), light, semilight (or demilight), book, normal (or regular), medium, semibold (or demibold), bold, ultrabold (or extrabold), heavy (or black), and ultraheavy (or ultrablack or extrablack).

outside-staff-priority (number):
475

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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), `self-alignment-interface`

(page 829), side-position-interface (page 832), text-interface (page 850), and text-script-interface (page 851).

This object is of class Item (characterized by item-interface (page 802)).

3.1.39 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 502).

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):
'(#<program> 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):
#<program>

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 829).

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):
`#<program>`

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 829).

This object supports the following interface(s): `control-point-interface` (page 781), `grob-interface` (page 793), `sticky-grob-interface` (page 846), and `text-interface` (page 850).

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 802), and `spanner-interface` (page 840).

3.1.40 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 502).

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 781), `grob-interface` (page 793), `sticky-grob-interface` (page 846), and `text-interface` (page 850).

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 802), and `spanner-interface` (page 840).

3.1.41 CueClef

A clef starting a cue. See also `Clef` (page 577), `ClefModifier` (page 580), and `CueEndClef` (page 592).

`CueClef` objects are created by the following engraver(s): `Cue_clef_engraver` (page 471).

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)
  (optional-material-end-bracket extra-space . 1.0)
  (optional-material-start-bracket extra-space . 1.0)
  (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 "Grobs and their break-align symbols" in *Notation 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 ly:grob::vertical-skylines-from-stencil >`

Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 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 829).

This object supports the following interface(s): `break-aligned-interface` (page 774), `clef-interface` (page 780), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `pure-from-neighbor-interface` (page 825), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.42 CueEndClef

A clef ending a cue. See also `Clef` (page 577), `ClefModifier` (page 580), and `CueClef` (page 589).

`CueEndClef` objects are created by the following engraver(s): `Cue_clef_engraver` (page 471).

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)
  (optional-material-end-bracket extra-space . 1.0)
  (optional-material-start-bracket extra-space . 1.0)
  (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 "Grobs and their break-align symbols" in *Notation 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.

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 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 829).

This object supports the following interface(s): `break-aligned-interface` (page 774), `clef-interface` (page 780), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `pure-from-neighbor-interface` (page 825), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.43 Custos

A custos, mainly used in older notation like Gregorian chant.

`Custos` objects are created by the following engraver(s): `Custos_engraver` (page 472).

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.

`no-ledgers` (boolean):
`#f`

If set, don't draw ledger lines on this object.

`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 "Grobs and their break-align symbols" in *Notation 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):
`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 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 829).

Remarks:

- The `ledger-positions` property holds positions that are taken as-is. Ledger lines may be placed on staff lines. If `ledger-positions` is not set for this grob but for `NoteHead`, use the latter one. If this isn't set either, use either the value set via `StaffSymbol` or fall back to the standard value.

This object supports the following interface(s): `break-aligned-interface` (page 774), `custos-interface` (page 782), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `ledgered-grob-interface` (page 806), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.44 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 472).

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)
  (optional-material-end-bracket extra-space . 1.0)
  (optional-material-start-bracket extra-space . 1.0)
  (first-note fixed-space . 1.3)
  (next-note semi-fixed-space . 0.9)
  (right-edge extra-space . 0.0))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *`break-align-symbol`* are listed in Section "Grobs and their break-align symbols" in *Notation 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 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 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 829).

This object supports the following interface(s): `break-aligned-interface` (page 774), `breathing-sign-interface` (page 776), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.45 DotColumn

An auxiliary grob to align stacked `Dots` (page 600), grobs of dotted notes and chords.

`DotColumn` objects are created by the following engraver(s): `Dot_column_engraver` (page 473), and `Vaticana_ligature_engraver` (page 513).

Standard settings:

`axes` (list):
`'(0)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`chord-dots-limit` (integer):
`3`

Limits the column of dots on each chord to the height of the chord plus `chord-dots-limit` staff positions.

`direction` (direction):
`1`

If `side-axis` is `0` (or `X`), then this property determines whether the object is placed `LEFT`, `CENTER` or `RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `UP`, `CENTER` or `DOWN`. Numerical values may also be used: `UP`=`1`, `DOWN`=`-1`, `LEFT`=`-1`, `RIGHT`=`1`, `CENTER`=`0`.

`padding` (dimension, in staff space):
`dot-column-interface::pad-by-one-dot-width`

Add this much extra space between objects that are next to each other.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 764), `dot-column-interface` (page 782), `grob-interface` (page 793), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.46 Dots

The dot(s) of a dotted note. See also `DotColumn` (page 600).

`Dots` objects are created by the following engraver(s): `Dots_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`.

`dot-count` (integer):
`dots::calc-dot-count`

The number of dots.

`extra-spacing-height` (pair of numbers):
`'(-0.5 . 0.5)`

In the horizontal spacing problem, we increase the height of each item by this amount (by adding the 'car' to the bottom of the item and adding the 'cdr' to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to `(-inf.0 . +inf.0)`.

`extra-spacing-width` (pair of numbers):
`'(0.0 . 0.2)`

In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

`glyph-name` (string):
`dots::calc-glyph-name`

The glyph name within the font.

In the context of (span) bar lines 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 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 782), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.47 DoublePercentRepeat

A double-percent symbol for repeating two bars. See also DoublePercentRepeatCounter (page 603), PercentRepeat (page 679), DoubleRepeatSlash (page 604), and RepeatSlash (page 687).

DoublePercentRepeat objects are created by the following engraver(s): Double_percent_repeat_engraver (page 473).

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 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 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), and `percent-repeat-interface` (page 824).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.48 DoublePercentRepeatCounter

A grob to print a counter for `DoublePercentRepeat` (page 602), grobs.

`DoublePercentRepeatCounter` objects are created by the following engraver(s): `Double_percent_repeat_engraver` (page 473).

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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.49 DoubleRepeatSlash

A double-percent symbol for repeating patterns shorter than a single measure, and which contain mixed durations. See also `PercentRepeat` (page 679), `DoublePercentRepeat` (page 602), and `RepeatSlash` (page 687).

`DoubleRepeatSlash` objects are created by the following engraver(s): `Slash_repeat_engraver` (page 503).

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 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 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), `percent-repeat-interface` (page 824), and `rhythmic-grob-interface` (page 826).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.50 DurationLine

A horizontal duration line, continuing rhythmic items (usually note heads).

`DurationLine` objects are created by the following engraver(s): `Duration_line_engraver` (page 474).

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-break-align-group . #f)
         (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 533, 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 761, 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 note heads.

`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 note head.

`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 ly:grob::vertical-skylines-from-stencil 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 829).

`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 783), `font-interface` (page 787), `grob-interface` (page 793), `horizontal-line-spanner-interface` (page 799), `line-interface` (page 807), `spanner-interface` (page 840), and `unbreakable-spanner-interface` (page 859).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.51 DynamicLineSpanner

An auxiliary grob providing a vertical baseline to align successive dynamic grobs (`DynamicText` (page 609), `DynamicTextSpanner` (page 611), and `Hairpin` (page 626)) within a staff.

`DynamicLineSpanner` objects are created by the following engraver(s): `Dynamic_align_engraver` (page 475).

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 ly:grob::vertical-skylines-from-element-stencils 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 ly:axis-group-interface::height ly:axis-group-interface::pure-height >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `axis-group-interface` (page 764), `dynamic-interface` (page 784), `dynamic-line-spanner-interface` (page 784), `grob-interface` (page 793), `outside-staff-interface` (page 822), `side-position-interface` (page 832), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.52 DynamicText

A dynamic text item like 'ff' or 'mp'. See also `DynamicLineSpanner` (page 607).

`DynamicText` objects are created by the following engraver(s): `Dynamic_engraver` (page 475).

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` (or `extralight`), `light`, `semilight` (or `demilight`), `book`, `normal` (or `regular`), `medium`, `semibold` (or `demibold`), `bold`, `ultrabold` (or `extrabold`), `heavy` (or `black`), and `ultraheavy` (or `ultrablack` or `extrablack`).

`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 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 note heads 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 #<program> >`

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 829).

This object supports the following interface(s): `dynamic-interface` (page 784), `dynamic-text-interface` (page 784), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), `script-interface` (page 827), `self-alignment-interface` (page 829), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.53 DynamicTextSpanner

Dynamic text like 'cresc', usually followed by a (dashed) line. See also DynamicLineSpanner (page 607), and TextSpanner (page 735).

DynamicTextSpanner objects are created by the following engraver(s): Dynamic_engraver (page 475).

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 fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

left-bound-info (alist, with symbols as keys):
ly:horizontal-line-spanner::calc-left-bound-info-and-text

An alist of properties for determining attachments of spanners to edges.

minimum-length (dimension, in staff space):
2.0

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the springs-and-rods property. If added to a Tie, this sets the minimum distance between note heads.

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 ly:grob::vertical-skylines-from-stencil 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 784), `dynamic-text-spanner-interface` (page 784), `font-interface` (page 787), `grob-interface` (page 793), `horizontal-line-spanner-interface` (page 799), `line-interface` (page 807), `spanner-interface` (page 840), and `text-interface` (page 850).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.54 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 476).

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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`
The vertical amount that this object is moved relative to its Y-parent.
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 829).

This object supports the following interface(s): `episema-interface` (page 785), `font-interface` (page 787), `grob-interface` (page 793), `horizontal-line-spanner-interface` (page 799), `line-interface` (page 807), `side-position-interface` (page 832), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.55 FingerGlideSpanner

A line connecting two `Fingering` (page 615), `StringNumber` (page 718), or `StrokeFinger` (page 720), grobs, usually indicating a gliding finger, the same string, or the same stroking finger for stringed instruments .

`FingerGlideSpanner` objects are created by the following engraver(s): `Finger_glide_engraver` (page 477).

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 533, 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 761, 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 note heads.

`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 note head.

`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 ly:grob::vertical-skylines-from-stencil 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 785), font-interface (page 787), grob-interface (page 793), line-spanner-interface (page 808), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.56 Fingering

A fingering symbol (usually a digit). See also FingeringColumn (page 617), and StrokeFinger (page 720).

Fingering objects are created by the following engraver(s): Fingering_engraver (page 478), and New_fingering_engraver (page 493).

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 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 786), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), `text-interface` (page 850), and `text-script-interface` (page 851).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.57 FingeringColumn

An auxiliary grob to align stacked `Fingering` (page 615), grobs.

`FingeringColumn` objects are created by the following engraver(s): `Fingering_column_engraver` (page 478).

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 786), `grob-interface` (page 793), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.58 Flag

A flag (in the musical sense).

`Flag` objects are created by the following engraver(s): `Stem_engraver` (page 506).

Standard settings:

`color` (color):
`#<program>`
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):
`#<program>`
This makes the grob invisible.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:flag::calc-y-offset 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 829).

This object supports the following interface(s): `flag-interface` (page 787), `font-interface` (page 787), `grob-interface` (page 793), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.59 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 478).

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):
`#<program>`

If set, footnotes are automatically numbered.

`break-visibility` (vector):
`#<program>`

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):
`#<program>`

A footnote for the grob.

`stencil` (stencil):
`ly:balloon-interface::print`

The symbol to print.

`text` (markup):
`#<program>`

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):
`#<program>`

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 829).

`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):
`#<program>`

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 829).

This object supports the following interface(s): `balloon-interface` (page 766), `font-interface` (page 787), `footnote-interface` (page 789), `grob-interface` (page 793), `sticky-grob-interface` (page 846), and `text-interface` (page 850).

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 802), and `spanner-interface` (page 840).

3.1.60 FretBoard

A fretboard diagram.

`FretBoard` objects are created by the following engraver(s): `Fretboard_engraver` (page 479).

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`.
  - `barre-thickness` – Thickness of barre line, in multiples of `dot-radius`. Only defined for `barre-type=straight`. Default value 1.
- `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-overhang` – Extension of string lines beyond last fret line, in multiples of `fret-distance`. Default value 1.
- `string-thickness-factor` – Factor for changing thickness of each string in the fret diagram. Thickness of string *k* is given by `thickness` * (1+`string-thickness-factor`) ^ (*k*-1). Default 0.
- `top-fret-thickness` – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.
- `xo-font-magnification` – Magnification used for mute and open string indicators. Default value 0.5.
- `xo-padding` – Padding for open and mute indicators from top fret. Default value 0.25.

`stencil` (stencil):
`fret-board::calc-stencil`

The symbol to print.

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 778), `font-interface` (page 787), `fret-diagram-interface` (page 789), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), and `rhythmic-grob-interface` (page 826).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.61 `Glissando`

A glissando line.

`Glissando` objects are created by the following engraver(s): `Glissando_engraver` (page 480).

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 ly:grob::vertical-skylines-from-stencil 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 787), `glissando-interface` (page 791), `grob-interface` (page 793), `line-interface` (page 807), `line-spanner-interface` (page 808), `spanner-interface` (page 840), and `unbreakable-spanner-interface` (page 859).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.62 GraceSpacing

An auxiliary grob to handle (horizontal) spacing of grace notes. See also `NoteSpacing` (page 672), `StaffSpacing` (page 712), and `SpacingSpanner` (page 705).

`GraceSpacing` objects are created by the following engraver(s): `Grace_spacing_engraver` (page 481).

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 791), `grob-interface` (page 793), `spacing-options-interface` (page 838), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.63 GridChordName

A chord name in a chord grid.

`GridChordName` objects are created by the following engraver(s): `Grid_chord_name_engraver` (page 481).

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):
`#<program>`
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 829).

`Y-offset` (number):
`#<program>`
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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `font-interface` (page 787), `grid-chord-name-interface` (page 792), `grob-interface` (page 793), `spanner-interface` (page 840), and `text-interface` (page 850).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.64 GridLine

A vertical line between staves, indicating rhythmic synchronization. See also `GridPoint` (page 625).

`GridLine` objects are created by the following engraver(s): `Grid_line_span_engraver` (page 481).

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 829).

This object supports the following interface(s): `grid-line-interface` (page 792), `grob-interface` (page 793), `item-interface` (page 802), and `self-alignment-interface` (page 829).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.65 GridPoint

An auxiliary grob marking a start or end point for a `GridLine` (page 624), grob.

`GridPoint` objects are created by the following engraver(s): `Grid_point_engraver` (page 482).

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 793), `grob-interface` (page 793), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.66 Hairpin

A hairpin. See also DynamicLineSpanner (page 607).

Hairpin objects are created by the following engraver(s): Dynamic_engraver (page 475).

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 note heads.

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 ly:grob::vertical-skylines-from-stencil 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 ly:grob::stencil-height ly:hairpin::pure-height >

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

Y-offset (number):
#<unpure-pure-container ly:self-alignment-interface::y-aligned-on-self 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 829).

This object supports the following interface(s): dynamic-interface (page 784), grob-interface (page 793), hairpin-interface (page 797), line-interface (page 807), outside-staff-interface (page 822), self-alignment-interface (page 829), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.67 HorizontalBracket

A horizontal bracket between notes. See also HorizontalBracketText (page 629), and MeasureSpanner (page 656).

HorizontalBracket objects are created by the following engraver(s): Horizontal_bracket_engraver (page 482).

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):
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):
`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 **p** and **f**) on their baselines.

`stencil` (stencil):
`ly:horizontal-bracket::print`

The symbol to print.

`thickness` (number):
`1.0`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *Staff*`.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container ly:grob::vertical-skylines-from-stencil ly:grob::pure-simple-vertical-skylines-from-extents >`

Two skylines, one above and one below this grob.

`Y-offset` (number):
`#<unpure-pure-container ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): grob-interface (page 793), horizontal-bracket-interface (page 799), line-interface (page 807), outside-staff-interface (page 822), side-position-interface (page 832), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.68 HorizontalBracketText

Text (markup) for a HorizontalBracket (page 627), grob.

HorizontalBracketText objects are created by the following engraver(s): Horizontal_bracket_engraver (page 482).

Standard settings:

direction (direction):
ly:horizontal-bracket-text::calc-direction

If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

font-size (number):
-1

The font size, compared to the 'normal' size. 0 is style-sheet's normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

padding (dimension, in staff space):
0.5

Add this much extra space between objects that are next to each other.

parent-alignment-X (number):
0

Specify on which point of the parent the object is aligned. The value -1 means aligned on parent's left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If 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 829).

`Y-offset` (number):
`#<unpure-pure-container ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `font-interface` (page 787), `grob-interface` (page 793), `horizontal-bracket-text-interface` (page 799), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), `spanner-interface` (page 840), and `text-interface` (page 850).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.69 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 483).

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 829).

`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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `font-interface` (page 787), `grob-interface` (page 793), `self-alignment-interface` (page 829), `side-position-interface` (page 832), `spanner-interface` (page 840), `system-start-text-interface` (page 848), and `text-interface` (page 850).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.70 InstrumentSwitch

This grob is deprecated. Do not use it.

`InstrumentSwitch` objects are created by the following engraver(s): `Instrument_switch_engraver` (page 483).

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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.71 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 484).

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 "Grobs and their break-align symbols" in *Notation 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 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `break-alignable-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `jump-script-interface` (page 804), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.72 KeyCancellation

A key cancellation, normally consisting of naturals, to be displayed (if necessary) immediately before a `KeySignature` (page 637), grob if the key changes.

KeyCancellation objects are created by the following engraver(s): Key_engraver (page 485).

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)
(optional-material-end-bracket extra-space . 1.0)
(optional-material-start-bracket extra-space . 1.0)
(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 "Grobs and their break-align symbols" in *Notation 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 ly:grob::vertical-skylines-from-stencil >`

Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `break-aligned-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `key-cancellation-interface` (page 804), `key-signature-interface` (page 804), `pure-from-neighbor-interface` (page 825), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.73 KeySignature

A key signature. See also `KeyCancellation` (page 634).

`KeySignature` objects are created by the following engraver(s): `Key_engraver` (page 485).

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)
  (optional-material-end-bracket extra-space . 1.0)
  (optional-material-start-bracket extra-space . 1.0)
  (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 "Grobs and their break-align symbols" in *Notation 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 ly:grob::vertical-skylines-from-stencil >`

Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `break-aligned-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `key-signature-interface` (page 804), `pure-from-neighbor-interface` (page 825), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.74 KievanLigature

An auxiliary grob to handle a melisma (ligature) as used in Kievan square notation. See also `MensuralLigature` (page 658), `VaticanaLigature` (page 753), and `LigatureBracket` (page 646).

`KievanLigature` objects are created by the following engraver(s): `Kievan_ligature_engraver` (page 486).

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 787), grob-interface (page 793), kievan-ligature-interface (page 805), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.75 LaissezVibrerTie

A laissez-vibrer tie (i.e., a tie from a note into nothing). See also LaissezVibrerTieColumn (page 642), RepeatTie (page 688), and Tie (page 737).

LaissezVibrerTie objects are created by the following engraver(s): Laissez_vibrer_engraver (page 486).

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 533, 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 761, 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 ly:grob::vertical-skylines-from-stencil >

Two skylines, one above and one below this grob.

Y-extent (pair of numbers):
#<unpure-pure-container 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 773), grob-interface (page 793), item-interface (page 802), semi-tie-interface (page 830), and tie-interface (page 852).

This object is of class Item (characterized by item-interface (page 802)).

3.1.76 LaissezVibrerTieColumn

An auxiliary grob to determine direction and shape of stacked LaissezVibrerTie (page 641), grobs.

LaissezVibrerTieColumn objects are created by the following engraver(s): Laissez_vibrer_engraver (page 486).

Standard settings:

head-direction (direction):
ly:semi-tie-column::calc-head-direction

Are the note heads left or right in a semitie?

X-extent (pair of numbers):
#f

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

Y-extent (pair of numbers):
#f

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): grob-interface (page 793), item-interface (page 802), and semi-tie-column-interface (page 830).

This object is of class Item (characterized by item-interface (page 802)).

3.1.77 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 486).

Standard settings:

layer (integer):
0

An integer which determines the order of printing objects. Objects with the lowest value of layer are drawn first, then objects with progressively higher values are drawn, so objects with higher values overwrite objects with lower values. By default most objects are assigned a layer value of 1.

length-fraction (number):
0.25

Multiplier for lengths. Used for determining ledger lines and stem lengths.

minimum-length-fraction (number):
0.25

Minimum length of ledger line as fraction of note head size.

springs-and-rods (boolean):
ly:ledger-line-spanner::set-spacing-rods

Dummy variable for triggering spacing routines.

stencil (stencil):
ly:ledger-line-spanner::print

The symbol to print.

vertical-skylines (pair of skylines):
#<unpure-pure-container ly:grob::vertical-skylines-from-stencil 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 793), ledger-line-spanner-interface (page 805), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.78 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 465).

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)
  (optional-material-end-bracket extra-space . 1.0)
  (optional-material-start-bracket 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 "Grobs and their break-align symbols" in *Notation 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):
`'(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 774), `grob-interface` (page 793), and `item-interface` (page 802).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.79 LigatureBracket

A horizontal bracket over a group of notes, usually indicating an ancient ligature if transcribed into modern notation. See also KievanLigature (page 640), MensuralLigature (page 658), and VaticanaLigature (page 753).

LigatureBracket objects are created by the following engraver(s): Ligature_bracket_engraver (page 487).

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 *Staff*`.StaffSymbol.thickness`).

`tuplet-slur` (boolean):
`#f`

Draw a slur instead of a bracket for tuplets.

`X-positions` (pair of numbers):
`ly:tuplet-bracket::calc-x-positions`

Pair of X staff coordinates of a spanner in the form (*left* . *right*), where both *left* and *right* are in `staff-space` units of the current staff.

This object supports the following interface(s): `grob-interface` (page 793), `line-interface` (page 807), `outside-staff-interface` (page 822), `spanner-interface` (page 840), and `tuplet-bracket-interface` (page 856).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.80 LyricExtender

An extender line in lyrics.

`LyricExtender` objects are created by the following engraver(s): `Extender_engraver` (page 476).

Standard settings:

`minimum-length` (dimension, in staff space):
`1.5`

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between note heads.

`remove-short-autoextender` (boolean):
`#t`

If set, auto-generated unbroken lyric extenders are removed if the lyric syllable stretches up to the last contained note head.

`stencil` (stencil):
`ly:lyric-extender::print`

The symbol to print.

`thickness` (number):
`0.8`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *Staff*`.StaffSymbol.thickness`).

This object supports the following interface(s): grob-interface (page 793), lyric-extender-interface (page 809), lyric-interface (page 811), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.81 LyricHyphen

A hyphen in lyrics. See also VowelTransition (page 760).

LyricHyphen objects are created by the following engraver(s): Hyphen_engraver (page 483).

Standard settings:

after-line-breaking (boolean):
ly:spanner::kill-zero-spanned-time

Dummy property, used to trigger callback for after-line-breaking.

dash-period (number):
10.0

The length of one dash together with whitespace. If negative, no line is drawn at all.

height (dimension, in staff space):
0.42

Height of an object in staff-space units.

length (dimension, in staff space):
0.66

User override for the stem length of unbeamed stems (each unit represents half a staff-space).

minimum-distance (dimension, in staff space):
0.1

Minimum distance between rest and notes or beam.

minimum-length (dimension, in staff space):
0.3

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the springs-and-rods property. If added to a Tie, this sets the minimum distance between note heads.

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 ly:grob::vertical-skylines-from-stencil 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 787), grob-interface (page 793), lyric-hyphen-interface (page 810), lyric-interface (page 811), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.82 LyricRepeatCount

A repeat count in lyrics.

LyricRepeatCount objects are created by the following engraver(s): Lyric_repeat_count_engraver (page 487).

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 "Grobs and their break-align symbols" in *Notation 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 (or extralight), light, semilight (or demilight), book, normal (or regular), medium, semibold (or demibold), bold, ultrabold (or extrabold), heavy (or black), and ultraheavy (or ultrablack or extrablack).

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):
#<program>

Text markup. See Section "Formatting text" in *Notation Reference*.

vertical-skylines (pair of skylines):
#<unpure-pure-container 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `lyric-interface` (page 811), `lyric-repeat-count-interface` (page 811), `self-alignment-interface` (page 829), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.83 LyricSpace

A space in lyrics.

`LyricSpace` objects are created by the following engraver(s): `Hyphen_engraver` (page 483).

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 793), `lyric-hyphen-interface` (page 810), `lyric-space-interface` (page 811), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.84 LyricText

A chunk of text in lyrics. See also `LyricExtender` (page 647), `LyricHyphen` (page 648), `LyricSpace` (page 651), and `VowelTransition` (page 760).

`LyricText` objects are created by the following engraver(s): `Lyric_engraver` (page 487).

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` (or `extralight`), `light`, `semilight` (or `demilight`), `book`, `normal` (or `regular`), `medium`, `semibold` (or `demibold`), `bold`, `ultrabold` (or `extrabold`), `heavy` (or `black`), and `ultraheavy` (or `ultrablack` or `extrablack`).

`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):
`#<program>`

Text markup. See Section "Formatting text" in *Notation Reference*.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container 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 note heads 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 787), `grob-interface` (page 793), `item-interface` (page 802), `lyric-syllable-interface` (page 811), `rhythmic-grob-interface` (page 826), `self-alignment-interface` (page 829), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.85 MeasureCounter

A grob to print a counter for measures.

`MeasureCounter` objects are created by the following engraver(s): `Measure_counter_engraver` (page 489).

Standard settings:

`count-from` (integer):
`1`

The first measure in a measure count receives this number. The following measures are numbered in increments from this initial value.

`direction` (direction):
`1`

If `side-axis` is `0` (or `X`), then this property determines whether the object is placed `LEFT`, `CENTER` or `RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `UP`, `CENTER` or `DOWN`. Numerical values may also be used: `UP`=`1`, `DOWN`=`-1`, `LEFT`=`-1`, `RIGHT`=`1`, `CENTER`=`0`.

`font-encoding` (symbol):
`'fetaText`

The font encoding is the broadest category for selecting a font. Currently, only LilyPond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`font-features` (list):
`'("cv47")`

Opentype features.

`font-size` (number):
`-2`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`number-range-separator` (markup):
`"--"`

For a measure counter extending over several measures (like with compressed multi-measure rests), this is the separator between the two printed numbers.

`outside-staff-horizontal-padding` (number):
`0.5`

By default, an outside-staff-object can be placed so that is it very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

`outside-staff-priority` (number):
`750`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`self-alignment-X` (number):
`0`

Specify alignment of an object. The value `-1` means left aligned, `0` centered, and `1` right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width. 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 829).

Y-offset (number):
#<unpure-pure-container ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >
The vertical amount that this object is moved relative to its Y-parent.
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 829).

This object supports the following interface(s): centered-spanner-interface (page 777), font-interface (page 787), grob-interface (page 793), measure-counter-interface (page 811), outside-staff-interface (page 822), self-alignment-interface (page 829), side-position-interface (page 832), spanner-interface (page 840), and text-interface (page 850).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.86 MeasureGrouping

A measure grouping or conducting sign.

MeasureGrouping objects are created by the following engraver(s): Measure_grouping_engraver (page 490).

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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >
The vertical amount that this object is moved relative to its Y-parent.
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 829).

This object supports the following interface(s): grob-interface (page 793), measure-grouping-interface (page 812), outside-staff-interface (page 822), side-position-interface (page 832), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.87 MeasureSpanner

A horizontal bracket between bar lines. See also HorizontalBracket (page 627).

MeasureSpanner objects are created by the following engraver(s): Measure_spanner_engraver (page 490).

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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `font-interface` (page 787), `grob-interface` (page 793), `line-interface` (page 807), `measure-spanner-interface` (page 812), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), `spanner-interface` (page 840), and `text-interface` (page 850).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.88 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 490).

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 793), item-interface (page 802), and melody-spanner-interface (page 813).

This object is of class Item (characterized by item-interface (page 802)).

3.1.89 MensuralLigature

A grob to display a ligature as used in mensural notation. See also KievanLigature (page 640), VaticanaLigature (page 753), and LigatureBracket (page 646).

MensuralLigature objects are created by the following engraver(s): Mensural_ligature_engraver (page 491).

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 787), grob-interface (page 793), mensural-ligature-interface (page 813), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.90 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 491).

Standard settings:

after-line-breaking (boolean):
ly:side-position-interface::move-to-extremal-staff

Dummy property, used to trigger callback for after-line-breaking.

`break-align-symbols` (list):
`'(time-signature)`

A list of *break-align symbols* that determines which breakable items to align this to. If the grob selected by the first symbol in the list is invisible due to `break-visibility`, we will align to the next grob (and so on). Choices are listed in Section "Grobs and their break-align symbols" in *Notation 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 flags to be displayed within markups (via `\note-by-number`). 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 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `break-alignable-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `metronome-mark-interface` (page 814), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.91 MultiMeasureRest

A multi-measure rest. See also `MultiMeasureRestNumber` (page 662), `MultiMeasureRestText` (page 665), `MultiMeasureRestScript` (page 664), and `Rest` (page 689).

`MultiMeasureRest` objects are created by the following engraver(s): `Multi_measure_rest_engraver` (page 492).

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*.

`space-increment` (dimension, in staff space):
`2.0`

The amount by which the total duration of a multi-measure rest affects horizontal spacing. Each doubling of the duration adds `space-increment` to the length of the bar.

`spacing-pair` (pair):
`'(break-alignment . break-alignment)`

A pair of alignment symbols which set an object's spacing relative to its left and right `BreakAlignments`.

For example, a `MultiMeasureRest` will ignore prefatory items at its bounds (i.e., clefs, key signatures and time signatures) using the following override:

```
\override MultiMeasureRest.spacing-pair =
              #'(staff-bar . staff-bar)
```

`springs-and-rods` (boolean):
`ly:multi-measure-rest::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:multi-measure-rest::print`

The symbol to print.

`thick-thickness` (number):
`6.6`

Thickness of the thick line in a bar line, expressed as a multiple of the default staff-line thickness (i.e., the visual output is *not* influenced by changes to *Staff*`.StaffSymbol.thickness`).

`usable-duration-logs` (list):
`'(-3 -2 -1 0)`

List of `duration-log`s that can be used in typesetting the grob.

`voiced-position` (number):
`4`

The staff position of a voiced `Rest`, negative if the rest has `direction DOWN`.

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 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 829).

This object supports the following interface(s): `font-interface` (page 787), `grob-interface` (page 793), `multi-measure-interface` (page 814), `multi-measure-rest-interface` (page 814), `outside-staff-interface` (page 822), `rest-interface` (page 826), `spanner-interface` (page 840), and `staff-symbol-referencer-interface` (page 843).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.92 MultiMeasureRestNumber

A grob to print the length of a `MultiMeasureRest` (page 660), grob.

`MultiMeasureRestNumber` objects are created by the following engraver(s): `Multi_measure_rest_engraver` (page 492).

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 ly:grob::vertical-skylines-from-stencil 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `font-interface` (page 787), `grob-interface` (page 793), `multi-measure-interface` (page 814),

multi-measure-rest-number-interface (page 816), outside-staff-interface (page 822), self-alignment-interface (page 829), side-position-interface (page 832), spanner-interface (page 840), and text-interface (page 850).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.93 MultiMeasureRestScript

An articulation (like a fermata) attached to a MultiMeasureRest (page 660), grob. See also Script (page 691).

MultiMeasureRestScript objects are created by the following engraver(s): Multi_measure_rest_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.

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 ly:grob::vertical-skylines-from-stencil 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`
The vertical amount that this object is moved relative to its Y-parent.
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 829).

This object supports the following interface(s): `font-interface` (page 787), `grob-interface` (page 793), `multi-measure-interface` (page 814), `outside-staff-interface` (page 822), `script-interface` (page 827), `self-alignment-interface` (page 829), `side-position-interface` (page 832), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.94 MultiMeasureRestText

A text markup for a `MultiMeasureRest` (page 660), grob. See also `TextScript` (page 733).

`MultiMeasureRestText` objects are created by the following engraver(s): `Multi_measure_rest_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`.

`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 ly:grob::vertical-skylines-from-stencil 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 829).

Y-extent (pair of numbers):
#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `font-interface` (page 787), `grob-interface` (page 793), `multi-measure-interface` (page 814), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), `spanner-interface` (page 840), and `text-interface` (page 850).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.95 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 496).

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 764), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `non-musical-paper-column-interface` (page 816), `paper-column-interface` (page 822), `separation-item-interface` (page 831), and `spaceable-grob-interface` (page 837).

This object is of class Paper_column (characterized by `paper-column-interface` (page 822)).

3.1.96 NoteCollision

An auxiliary grob to group `NoteColumn` (page 669), grobs from several voices, mainly to handle note collisions. See also `RestCollision` (page 690).

`NoteCollision` objects are created by the following engraver(s): `Collision_engraver` (page 469).

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 ly:axis-group-interface::height ly:axis-group-interface::pure-height >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 764), `grob-interface` (page 793), `item-interface` (page 802), and `note-collision-interface` (page 817).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.97 NoteColumn

An auxiliary grob to align stacked notes, stems, flags, accidentals, and other items from the same voice. See also `NoteCollision` (page 668).

`NoteColumn` objects are created by the following engraver(s): `Rhythmic_column_engraver` (page 501).

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 ly:axis-group-interface::height ly:axis-group-interface::pure-height >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 764), `bend-interface` (page 772), `grob-interface` (page 793), `item-interface` (page 802), `note-column-interface` (page 818), and `separation-item-interface` (page 831).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.98 NoteHead

A note head. See also `TabNoteHead` (page 729).

`NoteHead` objects are created by the following engraver(s): `Completion_heads_engraver` (page 469), `Drum_notes_engraver` (page 474), and `Note_heads_engraver` (page 494).

Standard settings:

`bend-me` (boolean):
`'()`

Decide whether this grob is bent.

`direction` (direction):
`note-head::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`.

`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 note head. Each component is measured in a -1 to 1 scale so that -1 is the left/bottom edge of the note's bounding box and 1 is the right/top edge.

`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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 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 829).

Remarks:

- For this grob, the `ledger-positions` property holds positions that are taken as-is, overriding `StaffSymbol.ledger-positions` (if set). Ledger lines may be placed on staff lines.

This object supports the following interface(s): `accidental-participating-head-interface` (page 762), `bend-interface` (page 772), `font-interface` (page 787), `gregorian-ligature-interface` (page 791), `grob-interface` (page 793), `item-interface` (page 802), `ledgered-interface` (page 806), `ligature-head-interface` (page 807), `mensural-ligature-interface` (page 813), `note-head-interface` (page 818), `rhythmic-grob-interface` (page 826), `rhythmic-head-interface` (page 827), `staff-symbol-referencer-interface` (page 843), and `vaticana-ligature-interface` (page 859).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.99 NoteName

A textual representation of a note name.

`NoteName` objects are created by the following engraver(s): `Note_name_engraver` (page 494).

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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 762), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `note-name-interface` (page 819), `self-alignment-interface` (page 829), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.100 NoteSpacing

An auxiliary grob to handle (horizontal) spacing of notes. See also `GraceSpacing` (page 623), `StaffSpacing` (page 712), and `SpacingSpanner` (page 705).

`NoteSpacing` objects are created by the following engraver(s): `Note_spacing_engraver` (page 495).

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 793), item-interface (page 802), note-spacing-interface (page 819), and spacing-interface (page 837).

This object is of class Item (characterized by item-interface (page 802)).

3.1.101 OptionalMaterialBracket

An in-staff bracket delimiting an optional passage.

OptionalMaterialBracket objects are created by the following engraver(s): Optional_material_bracket_engraver (page 495).

Standard settings:

break-align-symbol (symbol):
callback

This key is used for aligning, ordering, and spacing breakable items. See Section "break-alignment-interface" in *Internals Reference*.

break-visibility (vector):
#<program>

A vector of 3 booleans, #(*end-of-line unbroken begin-of-line*). #t means visible, #f means killed.

break-visibility-passage-default (vector):
#(#t #t #f)

The value to use for break-visibility when the item does not specifically mark the start or end of a passage. (It might be both or neither, depending on the type of item.)

break-visibility-passage-end (vector):
#(#t #t #f)

The value to use for break-visibility when the item marks the end of a passage.

break-visibility-passage-start (vector):
#(#f #t #t)

The value to use for break-visibility when the item marks the start of a passage.

direction (direction):
#<program>

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.

positions (pair of numbers):
optional-material-bracket::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):
0.75

In a bracket indicating non-arpeggio or optional material, the length of the horizontal edges.

space-alist (alist, with symbols as keys):
```
'((ambitus extra-space . 2.0)
  (breathing-sign minimum-space . 1.0)
  (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 . 1.0)
  (clef minimum-space . 2.0)
  (cue-clef minimum-space . 2.0)
  (cue-end-clef minimum-space . 2.0)
  (optional-material-end-bracket extra-space . 1.0)
  (optional-material-start-bracket extra-space . 1.0)
  (first-note extra-space . 0.5)
  (next-note extra-space . 0.5)
  (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 "Grobs and their break-align symbols" in *Notation 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:chord-bracket::print`

The symbol to print.

`thickness` (number):
`1.5`

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 ly:grob::stencil-height ly:arpeggio::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): break-aligned-interface (page 774), grob-interface (page 793), item-interface (page 802), optional-material-bracket-interface (page 820), and passage-delimiter-interface (page 823).

This object is of class Item (characterized by item-interface (page 802)).

3.1.102 OttavaBracket

An ottava bracket.

OttavaBracket objects are created by the following engraver(s): Ottava_spanner_engraver (page 495).

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 (or extralight), light, semilight (or demilight), book, normal (or regular), medium, semibold (or demibold), bold, ultrabold (or extrabold), heavy (or black), and ultraheavy (or ultrablack or extrablack).

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 note heads.

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 ly:grob::vertical-skylines-from-stencil ly:grob::pure-simple-vertical-skylines-from-extents >

Two skylines, one above and one below this grob.

Y-offset (number):
#<unpure-pure-container ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): font-interface (page 787), grob-interface (page 793), horizontal-bracket-interface (page 799), line-interface (page 807), ottava-bracket-interface (page 821), outside-staff-interface (page 822), side-position-interface (page 832), spanner-interface (page 840), and text-interface (page 850).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.103 PaperColumn

An auxiliary grob grouping musical items to handle the flexible horizontal space between musical and non-musical columns. See also NonMusicalPaperColumn (page 667).

PaperColumn objects are created by the following engraver(s): Paper_column_engraver (page 496).

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 764), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `musical-paper-column-interface` (page 816), `paper-column-interface` (page 822), `separation-item-interface` (page 831), and `spaceable-grob-interface` (page 837).

This object is of class Paper_column (characterized by `paper-column-interface` (page 822)).

3.1.104 Parentheses

A grob to create parentheses around other grobs.

`Parentheses` objects are created by the following engraver(s): `Parenthesis_engraver` (page 496).

Standard settings:

`break-visibility` (vector):
`#<program>`

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 parentheses-interface::calc-Y-extent >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container #<program> #<program> >`
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 829).

This object supports the following interface(s): `font-interface` (page 787), `grob-interface` (page 793), `parentheses-interface` (page 823), and `sticky-grob-interface` (page 846).

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 802), and `spanner-interface` (page 840).

3.1.105 PercentRepeat

A percent symbol for repeating a bar. See also `PercentRepeatCounter` (page 680), `DoublePercentRepeat` (page 602), `DoubleRepeatSlash` (page 604), and `RepeatSlash` (page 687).

`PercentRepeat` objects are created by the following engraver(s): `Percent_repeat_engraver` (page 497).

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 829).

This object supports the following interface(s): `centered-spanner-interface` (page 777), `font-interface` (page 787), `grob-interface` (page 793), `multi-measure-rest-interface` (page 814), `percent-repeat-interface` (page 824), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.106 PercentRepeatCounter

A grob to print a counter for `PercentRepeat` (page 679), grobs.

`PercentRepeatCounter` objects are created by the following engraver(s): `Percent_repeat_engraver` (page 497).

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.

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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `font-interface` (page 787), `grob-interface` (page 793), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), `spanner-interface` (page 840), and `text-interface` (page 850).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.107 PhrasingSlur

A phrasing slur, indicating a 'musical sentence'. See also `Slur` (page 700).

`PhrasingSlur` objects are created by the following engraver(s): `Phrasing_slur_engraver` (page 497).

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)
  (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 533, 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 761, 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 note heads.

`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 ly:grob::vertical-skylines-from-stencil 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 ly:slur::height 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 773), `grob-interface` (page 793), `outside-staff-interface` (page 822), `slur-interface` (page 834), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.108 PianoPedalBracket

A piano pedal bracket. It can also be part of `SostenutoPedal` (page 702), `SustainPedal` (page 722), or `UnaCordaPedal` (page 750), grobs if they are printed in a bracketed style.

`PianoPedalBracket` objects are created by the following engraver(s): `Piano_pedal_engraver` (page 498).

Standard settings:

`bound-padding` (number):
`1.0`

The amount of padding to insert around spanner bounds.

`bracket-flare` (pair of numbers):
`'(0.5 . 0.5)`

A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`direction` (direction):
`-1`

If `side-axis` is `0` (or `X`), then this property determines whether the object is placed `LEFT`, `CENTER` or `RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `UP`, `CENTER` or `DOWN`. Numerical values may also be used: `UP`=`1`, `DOWN`=`-1`, `LEFT`=`-1`, `RIGHT`=`1`, `CENTER`=`0`.

`edge-height` (pair):
`'(1.0 . 1.0)`

A pair of numbers specifying the heights of the vertical edges: `(`*`left-height`* `.` *`right-height`*`)`.

`shorten-pair` (pair of numbers):
`'(0.0 . 0.0)`

The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`stencil` (stencil):
`ly:piano-pedal-bracket::print`

The symbol to print.

`style` (symbol):
`'line`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number):
`1.0`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *Staff*`.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container ly:grob::vertical-skylines-from-stencil ly:grob::pure-simple-vertical-skylines-from-extents >`

Two skylines, one above and one below this grob.

This object supports the following interface(s): `grob-interface` (page 793), `line-interface` (page 807), `piano-pedal-bracket-interface` (page 824), `piano-pedal-interface` (page 825), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.109 RehearsalMark

A rehearsal mark.

`RehearsalMark` objects are created by the following engraver(s): `Mark_engraver` (page 488).

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 "Grobs and their break-align symbols" in *Notation Reference*.

`break-visibility` (vector):
`#(#f #t #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`direction` (direction):
`1`

If `side-axis` is `0` (or `X`), then this property determines whether the object is placed `LEFT`, `CENTER` or `RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `UP`, `CENTER` or `DOWN`. Numerical values may also be used: `UP`=`1`, `DOWN`=`-1`, `LEFT`=`-1`, `RIGHT`=`1`, `CENTER`=`0`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

`font-size` (number):
`2`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`outside-staff-horizontal-padding` (number):
`0.2`

By default, an outside-staff-object can be placed so that is it very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

`outside-staff-priority` (number):
`1500`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`padding` (dimension, in staff space):
`0.8`

Add this much extra space between objects that are next to each other.

`self-alignment-X` (number):
`break-alignable-interface::self-alignment-opposite-of-anchor`

Specify alignment of an object. The value `-1` means left aligned, `0` centered, and `1` right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width. 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 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `break-alignable-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `mark-interface` (page 811), `outside-staff-interface` (page 822), `rehearsal-mark-interface` (page 826), `self-alignment-interface` (page 829), `side-position-interface` (page 832), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.110 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 679), `DoublePercentRepeat` (page 602), and `DoubleRepeatSlash` (page 604).

`RepeatSlash` objects are created by the following engraver(s): `Slash_repeat_engraver` (page 503).

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 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 793), item-interface (page 802), percent-repeat-interface (page 824), and rhythmic-grob-interface (page 826).

This object is of class Item (characterized by item-interface (page 802)).

3.1.111 RepeatTie

A repeat tie (i.e., a tie from nothing to a note). See also RepeatTieColumn (page 689), LaissezVibrerTie (page 641), and Tie (page 737).

RepeatTie objects are created by the following engraver(s): Repeat_tie_engraver (page 500).

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 533, 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 761, 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 ly:grob::vertical-skylines-from-stencil >`
Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 773), `grob-interface` (page 793), `item-interface` (page 802), `semi-tie-interface` (page 830), and `tie-interface` (page 852).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.112 RepeatTieColumn

An auxiliary grob to determine direction and shape of stacked `RepeatTie` (page 688), grobs.

`RepeatTieColumn` objects are created by the following engraver(s): `Repeat_tie_engraver` (page 500).

Standard settings:

`head-direction` (direction):
`ly:semi-tie-column::calc-head-direction`
Are the note heads left or right in a semitie?

`X-extent` (pair of numbers):
`#f`
Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#f`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `grob-interface` (page 793), `item-interface` (page 802), and `semi-tie-column-interface` (page 830).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.113 Rest

An ordinary rest. See also `MultiMeasureRest` (page 660).

`Rest` objects are created by the following engraver(s): `Completion_rest_engraver` (page 470), and `Rest_engraver` (page 500).

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 ly:grob::vertical-skylines-from-stencil 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 ly:rest::height ly:rest::pure-height >`
Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container 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 829).

This object supports the following interface(s): `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `rest-interface` (page 826), `rhythmic-grob-interface` (page 826), `rhythmic-head-interface` (page 827), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.114 RestCollision

An auxiliary grob to handle rest collisions of different voices. See also `NoteCollision` (page 668).

`RestCollision` objects are created by the following engraver(s): `Rest_collision_engraver` (page 500).

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 793), item-interface (page 802), and rest-collision-interface (page 826).

This object is of class Item (characterized by item-interface (page 802)).

3.1.115 Script

An articulation (staccato, accent, etc.). See also ScriptColumn (page 692), ScriptRow (page 693), and MultiMeasureRestScript (page 664).

Script objects are created by the following engraver(s): Drum_notes_engraver (page 474), New_fingering_engraver (page 493), and Script_engraver (page 501).

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.

extra-spacing-height (pair of numbers):
horizontal-script::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).

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.

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 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 #<program> #<program> >`
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 829).

Remarks:

- The `ledger-positions` property holds positions that are taken as-is. Ledger lines may be placed on staff lines. If `ledger-positions` is not set for this grob but for `NoteHead`, use the latter one. If this isn't set either, use either the value set via `StaffSymbol` or fall back to the standard value.

This object supports the following interface(s): `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `ledgered-grob-interface` (page 806), `outside-staff-interface` (page 822), `script-interface` (page 827), `self-alignment-interface` (page 829), and `side-position-interface` (page 832).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.116 ScriptColumn

An auxiliary grob to (vertically) align stacked `Script` (page 691), grobs.

`ScriptColumn` objects are created by the following engraver(s): `Non_musical_script_column_engraver` (page 493), and `Script_column_engraver` (page 501).

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 793), `item-interface` (page 802), and `script-column-interface` (page 827).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.117 ScriptRow

An auxiliary grob to horizontally align stacked Script (page 691), grobs.

ScriptRow objects are created by the following engraver(s): Script_row_engraver (page 501).

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 793), item-interface (page 802), and script-column-interface (page 827).

This object is of class Item (characterized by item-interface (page 802)).

3.1.118 SectionLabel

A section label, for example 'Coda'.

SectionLabel objects are created by the following engraver(s): Mark_engraver (page 488).

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 "Grobs and their break-align symbols" in *Notation Reference*.

break-visibility (vector):
#(#f #t #t)

A vector of 3 booleans, #(*end-of-line unbroken begin-of-line*). #t means visible, #f means killed.

direction (direction):
1

If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

extra-spacing-width (pair of numbers):
'(+inf.0 . -inf.0)

In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

font-size (number):
1.5

The font size, compared to the 'normal' size. 0 is style-sheet's normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

non-musical (boolean):
#t

True if the grob belongs to a NonMusicalPaperColumn.

outside-staff-horizontal-padding (number):
0.2

By default, an outside-staff-object can be placed so that is it very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

outside-staff-priority (number):
1450

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller outside-staff-priority is closer to the staff.

padding (dimension, in staff space):
0.8

Add this much extra space between objects that are next to each other.

self-alignment-X (number):
-1

Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width. 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 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 829).

Y-extent (pair of numbers):
#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side
ly:side-position-interface::pure-y-aligned-side >

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `break-alignable-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), `section-label-interface` (page 828), `self-alignment-interface` (page 829), `side-position-interface` (page 832), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.119 SegnoMark

A segno mark (created with `\repeat segno`, not with `\segno`).

`SegnoMark` objects are created by the following engraver(s): `Mark_engraver` (page 488).

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 "Grobs and their break-align symbols" in *Notation 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 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `break-alignable-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `mark-interface` (page 811), `outside-staff-interface` (page 822), `segno-mark-interface` (page 828), `self-alignment-interface` (page 829), `side-position-interface` (page 832), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.120 SignumRepetitionis

An ancient end-repeat sign.

`SignumRepetitionis` objects are created by the following engraver(s): `Signum_repetitionis_engraver` (page 502).

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):
`#<program>`

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)
(optional-material-end-bracket extra-space . 1.0)
(optional-material-start-bracket extra-space . 1.0)
(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 "Grobs and their break-align symbols" in *Notation 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 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 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `pure-from-neighbor-interface` (page 825), and `signum-repetitionis-interface` (page 833).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.121 Slur

A slur. See also `PhrasingSlur` (page 682).

`Slur` objects are created by the following engraver(s): `Slur_engraver` (page 503).

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 533, 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 761, 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 note heads.

`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 ly:grob::vertical-skylines-from-stencil 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 ly:slur::height 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 773), `grob-interface` (page 793), `outside-staff-interface` (page 822), `slur-interface` (page 834), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.122 SostenutoPedal

A sostenuto pedal mark. See also `SostenutoPedalLineSpanner` (page 704), `PianoPedalBracket` (page 684), `SustainPedal` (page 722), and `UnaCordaPedal` (page 750).

`SostenutoPedal` objects are created by the following engraver(s): `Piano_pedal_engraver` (page 498).

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 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 787), `grob-interface` (page 793), `item-interface` (page 802), `piano-pedal-script-interface` (page 825), `self-alignment-interface` (page 829), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.123 SostenutoPedalLineSpanner

An auxiliary grob providing a baseline to align consecutive SostenutoPedal (page 702), grobs vertically.

SostenutoPedalLineSpanner objects are created by the following engraver(s): Piano_pedal_align_engraver (page 498).

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 ly:grob::vertical-skylines-from-element-stencils 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 ly:axis-group-interface::height ly:axis-group-interface::pure-height >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `axis-group-interface` (page 764), `grob-interface` (page 793), `outside-staff-interface` (page 822), `piano-pedal-interface` (page 825), `side-position-interface` (page 832), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.124 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 623), `NoteSpacing` (page 672), and `StaffSpacing` (page 712).

`SpacingSpanner` objects are created by the following engraver(s): `Spacing_engraver` (page 503).

Standard settings:

`average-spacing-wishes` (boolean):
`#t`

If set, the spacing wishes are averaged over staves.

`base-shortest-duration` (moment):
`#<Mom 3/16>`

Spacing is based on the shortest notes in a piece. Normally, pieces are spaced as if notes at least as short as this are present.

`common-shortest-duration` (moment):
`ly:spacing-spanner::calc-common-shortest-duration`

The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

`shortest-duration-space` (number):
`2.0`

Start with this multiple of `spacing-increment` space for the shortest duration. See also Section "spacing-spanner-interface" in *Internals Reference*.

`spacing-increment` (dimension, in staff space):
`1.2`

The unit of length for note-spacing. Typically, the width of a note head. See also Section "spacing-spanner-interface" in *Internals Reference*.

`springs-and-rods` (boolean):
`ly:spacing-spanner::set-springs`

Dummy variable for triggering spacing routines.

This object supports the following interface(s): grob-interface (page 793), spacing-options-interface (page 838), spacing-spanner-interface (page 838), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.125 SpanBar

A span bar, i.e., the parts of a multi-staff bar line that are outside of staves. See also SpanBarStub (page 707).

SpanBar objects are created by the following engraver(s): Span_bar_engraver (page 504).

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 ly:axis-group-interface::height 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 767), `break-aligned-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), and `span-bar-interface` (page 839).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.126 SpanBarStub

An auxiliary grob, acting like a fake `SpanBar` (page 706), grob in contexts such as `Lyrics` (page 223), 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 504).

Standard settings:

`allow-span-bar` (boolean):
`#t`

If false, no inter-staff bar line will be created below this bar line.

`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):
`#<program>`

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 pure-from-neighbor-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): `grob-interface` (page 793), `item-interface` (page 802), `pure-from-neighbor-interface` (page 825), and `span-bar-stub-interface` (page 839).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.127 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 502).

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):
#<program>

A vector of 3 booleans, #(*end-of-line unbroken begin-of-line*). #t means visible, #f means killed.

break-visibility-passage-default (vector):
#(#t #t #f)

The value to use for break-visibility when the item does not specifically mark the start or end of a passage. (It might be both or neither, depending on the type of item.)

break-visibility-passage-end (vector):
#(#t #t #f)

The value to use for break-visibility when the item marks the end of a passage.

break-visibility-passage-start (vector):
#(#f #t #t)

The value to use for break-visibility when the item marks the start of a passage.

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)
  (left-edge extra-space . 0.0)
  (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)
  (optional-material-end-bracket extra-space . 1.0)
```

```
(optional-material-start-bracket extra-space . 1.0)
(first-note extra-space . 1.0)
(right-edge fixed-space . 0))
```

An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for *break-align-symbol* are listed in Section "Grobs and their break-align symbols" in *Notation 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):
```
'(#<program>
  ((#<program>)
   (#<program> "dots.dot")
   (#<program> "dots.dot")
   (#<program> "dots.dot")
   (#<program>)))
```
Text markup. See Section "Formatting text" in *Notation Reference*.

`whiteout` (boolean-or-number):
`#t`
If a number or true, the grob is printed over a white background to white-out underlying material, if the grob is visible. A number indicates how far the white background extends beyond the bounding box of the grob as a multiple of the staff-line thickness. The `LyricHyphen` grob uses a special implementation of whiteout: A positive number indicates how far the white background extends beyond the bounding box in multiples of `line-thickness`. The shape of the background is determined by `whiteout-style`.
Usually `#f` by default. If `whiteout-color` is set, use this color instead of white for the background.

`Y-extent` (pair of numbers):
`#<unpure-pure-container ly:grob::stencil-height staff-ellipsis::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): `break-aligned-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `passage-delimiter-interface` (page 823), `staff-ellipsis-interface` (page 841), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.128 StaffGrouper

An auxiliary grob to manage vertical spacing of staff groups. See also `VerticalAlignment` (page 753), and `VerticalAxisGroup` (page 754).

`StaffGrouper` objects are created by the following engraver(s): `Vertical_align_engraver` (page 513).

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 793), `spanner-interface` (page 840), and `staff-grouper-interface` (page 841).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.129 StaffHighlight

A colored span to highlight a music passage.

`StaffHighlight` objects are created by the following engraver(s): `Staff_highlight_engraver` (page 505).

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):

```
#<program>
```

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 793), `spanner-interface` (page 840), and `staff-highlight-interface` (page 841).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.130 StaffSpacing

An auxiliary grob to handle spacing within a staff. See also `NoteSpacing` (page 672), `GraceSpacing` (page 623), and `SpacingSpanner` (page 705).

`StaffSpacing` objects are created by the following engraver(s): `Separating_line_group_engraver` (page 502).

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 793), `item-interface` (page 802), `spacing-interface` (page 837), and `staff-spacing-interface` (page 842).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.131 StaffSymbol

A staff symbol, usually five horizontal lines.

StaffSymbol objects are created by the following engraver(s): Staff_symbol_engraver (page 506), and Tab_staff_symbol_engraver (page 508).

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 "Grobs and their break-align symbols" in *Notation 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 two 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 ly:staff-symbol::height >

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

Remarks:

- For this grob, the ledger-positions property defines a repeating pattern of ledger lines. Positions put into sublists are always be shown together, and values identical to staff line positions are ignored.
- If the ledger-positions-function property is set, ledger-positions and ledger-extra are ignored.

This object supports the following interface(s): grob-interface (page 793), spanner-interface (page 840), and staff-symbol-interface (page 842).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.132 StanzaNumber

A stanza number (or markup) for lyrics.

StanzaNumber objects are created by the following engraver(s): Stanza_number_engraver (page 506).

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 (or extralight), light, semilight (or demilight), book, normal (or regular), medium, semibold (or demibold), bold, ultrabold (or extrabold), heavy (or black), and ultraheavy (or ultrablack or extrablack).

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 829).

Y-extent (pair of numbers):
#<unpure-pure-container 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 787), grob-interface (page 793), item-interface (page 802), side-position-interface (page 832), stanza-number-interface (page 843), and text-interface (page 850).

This object is of class Item (characterized by item-interface (page 802)).

3.1.133 Stem

A stem. See also StemStub (page 717).

Stem objects are created by the following engraver(s): Span_stem_engraver (page 504), and Stem_engraver (page 506).

Standard settings:

beamlet-default-length (pair):
'(1.1 . 1.1)

A pair of numbers. The first number specifies the default length of a beamlet that sticks out of the left hand side of this stem; the second number specifies the default length of the beamlet to the right. The actual length of a beamlet is determined by taking either the default length or the length specified by beamlet-max-length-proportion, whichever is smaller.

beamlet-max-length-proportion (pair):
'(0.75 . 0.75)

The maximum length of a beamlet, as a proportion of the distance between two adjacent stems.

default-direction (direction):
ly:stem::calc-default-direction

Direction determined by note head positions.

details (alist, with symbols as keys):
```
'((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 533, 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 761, 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 ly:stem::calc-length 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 ly:stem::calc-stem-begin-position 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 829).

Y-extent (pair of numbers):
#<unpure-pure-container ly:stem::height 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 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 829).

This object supports the following interface(s): grob-interface (page 793), item-interface (page 802), and stem-interface (page 843).

This object is of class Item (characterized by item-interface (page 802)).

3.1.134 StemStub

An auxiliary grob that prevents cross-staff Stem (page 715), grobs from colliding with articulations.

StemStub objects are created by the following engraver(s): Stem_engraver (page 506).

Standard settings:

extra-spacing-height (pair of numbers):
stem-stub::extra-spacing-height

In the horizontal spacing problem, we increase the height of each item by this amount (by adding the 'car' to the bottom of the item and adding the 'cdr' to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

X-extent (pair of numbers):
stem-stub::width

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

Y-extent (pair of numbers):
#<unpure-pure-container #f stem-stub::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): grob-interface (page 793), and item-interface (page 802).

This object is of class Item (characterized by item-interface (page 802)).

3.1.135 StemTremolo

A stem tremolo.

StemTremolo objects are created by the following engraver(s): Stem_engraver (page 506).

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 829).

Y-extent (pair of numbers):
#<unpure-pure-container ly:grob::stencil-height 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 ly:stem-tremolo::calc-y-offset 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 829).

This object supports the following interface(s): grob-interface (page 793), item-interface (page 802), self-alignment-interface (page 829), and stem-tremolo-interface (page 846).

This object is of class Item (characterized by item-interface (page 802)).

3.1.136 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 493).

Standard settings:

add-stem-support (boolean):
only-if-beamed

If set, the Stem object is included in this script's support.

`avoid-slur` (symbol):
`'around`

Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

`font-encoding` (symbol):
`'fetaText`

The font encoding is the broadest category for selecting a font. Currently, only LilyPond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`font-features` (list):
`'("cv47")`

Opentype features.

`font-size` (number):
`-5`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`number-type` (symbol):
`'arabic`

Numbering style. Choices include `arabic`, `roman-ij-lower`, `roman-ij-upper`, `roman-lower`, and `roman-upper`.

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number):
`0`

Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If 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 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 787), `grob-interface` (page 793), `item-interface` (page 802), `number-interface` (page 820), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), `string-number-interface` (page 847), `text-interface` (page 850), and `text-script-interface` (page 851).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.137 StrokeFinger

A markup (usually a lowercase letter) to indicate right-hand fingering. See also `Fingering` (page 615).

`StrokeFinger` objects are created by the following engraver(s): `New_fingering_engraver` (page 493).

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`.

`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.

`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.

`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):
`0.3`

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):
`stroke-finger::calc-text`

Text markup. See Section "Formatting text" in *Notation Reference*.

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 787), `grob-interface` (page 793), `item-interface` (page 802), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), `stroke-finger-interface` (page 847), `text-interface` (page 850), and `text-script-interface` (page 851).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.138 SustainPedal

A sustain pedal mark. See also `SustainPedalLineSpanner` (page 723), `PianoPedalBracket` (page 684), `SostenutoPedal` (page 702), and `UnaCordaPedal` (page 750).

`SustainPedal` objects are created by the following engraver(s): `Piano_pedal_engraver` (page 498).

Standard settings:

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

`padding` (dimension, in staff space):
`0.0`

Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number):
`#f`

Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If 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 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 829).

`Y-extent` (pair of numbers):

`#<unpure-pure-container 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 787), `grob-interface` (page 793), `item-interface` (page 802), `piano-pedal-interface` (page 825), `piano-pedal-script-interface` (page 825), `self-alignment-interface` (page 829), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.139 SustainPedalLineSpanner

An auxiliary grob providing a baseline to align consecutive `SustainPedal` (page 722), grobs vertically.

`SustainPedalLineSpanner` objects are created by the following engraver(s): `Piano_pedal_align_engraver` (page 498).

Standard settings:

`axes` (list):

`'(1)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction` (direction):

`-1`

If `side-axis` is `0` (or `X`), then this property determines whether the object is placed `LEFT`, `CENTER` or `RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `UP`, `CENTER` or `DOWN`. Numerical values may also be used: `UP`=`1`, `DOWN`=`-1`, `LEFT`=`-1`, `RIGHT`=`1`, `CENTER`=`0`.

`minimum-space` (dimension, in staff space):

`1.0`

Minimum distance that the victim should move (after padding).

`outside-staff-priority` (number):

`1000`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`padding` (dimension, in staff space):

`1.2`

Add this much extra space between objects that are next to each other.

`side-axis` (number):

`1`

If the value is `X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `Y` or `1`, it is placed vertically.

staff-padding (dimension, in staff space):
1.2

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

vertical-skylines (pair of skylines):
#<unpure-pure-container ly:grob::vertical-skylines-from-element-stencils 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 ly:axis-group-interface::height ly:axis-group-interface::pure-height >

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

Y-offset (number):
#<unpure-pure-container ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): axis-group-interface (page 764), grob-interface (page 793), outside-staff-interface (page 822), piano-pedal-interface (page 825), side-position-interface (page 832), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.140 System

The top-level grob of a score. All other grobs are descendants of it.

System objects are created internally by the Score_engraver translator group..

Standard settings:

axes (list):
'(0 1)

List of axis numbers. In the case of alignment grobs, this should contain only one number.

outside-staff-placement-directive (symbol):
'left-to-right-polite

One of four directives telling how outside staff objects should be placed.

- left-to-right-greedy – Place each successive grob from left to right.
- left-to-right-polite – Place a grob from left to right only if it does not potentially overlap with another grob that has been placed on a pass through a grob array. If there is overlap, do another pass to determine placement.
- right-to-left-greedy – Same as left-to-right-greedy, but from right to left.

- `right-to-left-polite` – Same as `left-to-right-polite`, but from right to left.

`show-vertical-skylines` (boolean):
`grob::show-skylines-if-debug-skylines-set`

If true, print this grob's vertical skylines. This is meant for debugging purposes.

`skyline-horizontal-padding` (number):
`1.0`

For determining the vertical distance between two staves, it is possible to have a configuration which would result in a tight interleaving of grobs from the top staff and the bottom staff. The larger this parameter is, the farther apart the staves are placed in such a configuration.

`vertical-skylines` (pair of skylines):
`ly:axis-group-interface::calc-skylines`

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container ly:system::height ly:system::calc-pure-height >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `axis-group-interface` (page 764), `grob-interface` (page 793), `outside-staff-axis-group-interface` (page 821), `spanner-interface` (page 840), and `system-interface` (page 847).

This object is of class System (characterized by `system-interface` (page 847)).

3.1.141 SystemStartBar

A bar line as a system start delimiter.

`SystemStartBar` objects are created by the following engraver(s): `System_start_delimiter_engraver` (page 507).

Standard settings:

`collapse-height` (dimension, in staff space):
`5.0`

Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

`direction` (direction):
`-1`

If `side-axis` is `0` (or `X`), then this property determines whether the object is placed `LEFT`, `CENTER` or `RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `UP`, `CENTER` or `DOWN`. Numerical values may also be used: `UP=1`, `DOWN=-1`, `LEFT=-1`, `RIGHT=1`, `CENTER=0`.

`padding` (dimension, in staff space):
`-0.1`

Add this much extra space between objects that are next to each other.

`stencil` (stencil):
`ly:system-start-delimiter::print`

The symbol to print.

`style` (symbol):
`'bar-line`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number):
`1.6`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *Staff*`.StaffSymbol.thickness`).

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`

The horizontal amount that this object is moved relative to its X-parent.

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 829).

This object supports the following interface(s): `grob-interface` (page 793), `side-position-interface` (page 832), `spanner-interface` (page 840), and `system-start-delimiter-interface` (page 848).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.142 SystemStartBrace

A brace as a system start delimiter.

`SystemStartBrace` objects are created by the following engraver(s): `System_start_delimiter_engraver` (page 507).

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 829).

This object supports the following interface(s): font-interface (page 787), grob-interface (page 793), side-position-interface (page 832), spanner-interface (page 840), and system-start-delimiter-interface (page 848).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.143 SystemStartBracket

A bracket as a system start delimiter.

SystemStartBracket objects are created by the following engraver(s): System_start_delimiter_engraver (page 507).

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 829).

This object supports the following interface(s): `font-interface` (page 787), `grob-interface` (page 793), `side-position-interface` (page 832), `spanner-interface` (page 840), and `system-start-delimiter-interface` (page 848).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.144 SystemStartSquare

A rectangle-like bracket as a start delimiter.

`SystemStartSquare` objects are created by the following engraver(s): `System_start_delimiter_engraver` (page 507).

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 829).

This object supports the following interface(s): `font-interface` (page 787), `grob-interface` (page 793), `side-position-interface` (page 832), `spanner-interface` (page 840), and `system-start-delimiter-interface` (page 848).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.145 TabNoteHead

A 'note head' (usually a digit) in a tablature. See also `NoteHead` (page 670).

`TabNoteHead` objects are created by the following engraver(s): `Tab_note_heads_engraver` (page 507).

Standard settings:

`after-line-breaking` (boolean):
`tab-note-head::handle-ties`

Dummy property, used to trigger callback for `after-line-breaking`.

`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 . #<program>)
   (width . 0.25))
  (harmonic-properties
   (angularity . 2)
   (half-thickness . 0.075)
   (padding . 0)
   (procedure . #<program>)
   (width . 0.25))
  (head-offset . 3/5)
  (tied-properties
   (note-head-visible . #t)
   (parenthesize . #t)
   (repeat-tied . #f)
   (tied . #f)))
```

An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 533, 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 761, 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 (or extralight), light, semilight (or demilight), book, normal (or regular), medium, semibold (or demibold), bold, ultrabold (or extrabold), heavy (or black), and ultraheavy (or ultrablack or extrablack).

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 note head. Each component is measured in a -1 to 1 scale so that -1 is the left/bottom edge of the note's bounding box and 1 is the right/top edge.

stencil (stencil):
tab-note-head::print

The symbol to print.

whiteout (boolean-or-number):
#t

If a number or true, the grob is printed over a white background to white-out underlying material, if the grob is visible. A number indicates how far the white background extends beyond the bounding box of the grob as a multiple of the staff-line thickness. The LyricHyphen grob uses a special implementation of whiteout: A positive number indicates how far the white background extends beyond the bounding box in multiples of line-thickness. The shape of the background is determined by whiteout-style.

Usually #f by default. If whiteout-color is set, use this color instead of white for the background.

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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 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 829).

This object supports the following interface(s): `bend-interface` (page 772), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `note-head-interface` (page 818), `rhythmic-grob-interface` (page 826), `rhythmic-head-interface` (page 827), `staff-symbol-referencer-interface` (page 843), `tab-note-head-interface` (page 849), and `text-interface` (page 850).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.146 TextMark

An arbitrary textual mark. See also `SectionLabel` (page 693), and `JumpScript` (page 633), for grobs with a more specific intent.

`TextMark` objects are created by the following engraver(s): `Text_mark_engraver` (page 509).

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 "Grobs and their break-align symbols" in *Notation 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):
#<program>

Text markup. See Section "Formatting text" in *Notation Reference*.

vertical-skylines (pair of skylines):
#<unpure-pure-container 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `break-alignable-interface` (page 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `mark-interface` (page 811), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), `text-interface` (page 850), and `text-mark-interface` (page 851).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.147 TextScript

A markup attached to a grob like a note head. See also `MultiMeasureRestText` (page 665).

`TextScript` objects are created by the following engraver(s): `Text_engraver` (page 509).

Standard settings:

`avoid-slur` (symbol):
`'around`

Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

`direction` (direction):
`-1`

If `side-axis` is `0` (or `X`), then this property determines whether the object is placed `LEFT`, `CENTER` or `RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `UP`, `CENTER` or `DOWN`. Numerical values may also be used: `UP`=`1`, `DOWN`=`-1`, `LEFT`=`-1`, `RIGHT`=`1`, `CENTER`=`0`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item).

In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

`outside-staff-horizontal-padding` (number):
`0.2`

By default, an outside-staff-object can be placed so that is it very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

`outside-staff-priority` (number):
`450`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`padding` (dimension, in staff space):
`0.3`

Add this much extra space between objects that are next to each other.

`parent-alignment-X` (number):
`#f`

Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If 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 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 note heads 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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `accidental-switch-interface` (page 762), `font-interface` (page 787), `grob-interface` (page 793), `instrument-specific-markup-interface` (page 800), `item-interface` (page 802), `outside-staff-interface` (page 822), `self-alignment-interface` (page 829), `side-position-interface` (page 832), `text-interface` (page 850), and `text-script-interface` (page 851).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.148 TextSpanner

Text like 'rit', usually followed by a (dashed) line. See also `DynamicTextSpanner` (page 611).

`TextSpanner` objects are created by the following engraver(s): `Text_spanner_engraver` (page 509).

Standard settings:

`bound-details` (alist, with symbols as keys):

```
'((left (padding . 0.25) (attach-dir . -1))
  (left-broken (attach-dir . 1))
  (right (padding . 0.25)))
```

An alist of properties for determining attachments of spanners to edges.

`dash-fraction` (number):
`0.2`

Size of the dashes, relative to `dash-period`. Should be between `0.1` and `1.0` (continuous line). If set to `0.0`, a dotted line is produced

dash-period (number):
3.0

The length of one dash together with whitespace. If negative, no line is drawn at all.

direction (direction):
1

If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

font-shape (symbol):
'italic

Select the shape of a font. 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 ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): font-interface (page 787), grob-interface (page 793), horizontal-line-spanner-interface (page 799), line-interface (page 807), outside-staff-interface (page 822), side-position-interface (page 832), and spanner-interface (page 840).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.149 Tie

A tie. See also TieColumn (page 739), LaissezVibrerTie (page 641), and RepeatTie (page 688).

Tie objects are created by the following engraver(s): Completion_heads_engraver (page 469), and Tie_engraver (page 509).

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 533, 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 761, 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):
`#<unpure-pure-container ly:grob::vertical-skylines-from-stencil ly:grob::pure-simple-vertical-skylines-from-extents >`

Two skylines, one above and one below this grob.

This object supports the following interface(s): `bezier-curve-interface` (page 773), `grob-interface` (page 793), `spanner-interface` (page 840), and `tie-interface` (page 852).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.150 TieColumn

An auxiliary grob to determine direction and shape of stacked Tie (page 737), grobs.

TieColumn objects are created by the following engraver(s): Completion_heads_engraver (page 469), and Tie_engraver (page 509).

Standard settings:

before-line-breaking (boolean):
ly:tie-column::before-line-breaking

Dummy property, used to trigger a callback function.

X-extent (pair of numbers):
#f

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

Y-extent (pair of numbers):
#f

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): grob-interface (page 793), spanner-interface (page 840), and tie-column-interface (page 852).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.151 TimeSignature

A time signature.

TimeSignature objects are created by the following engraver(s): Time_signature_engraver (page 510).

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.

`denominator-style` (symbol):
`'default`

The style of denominators in a time signature.

`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)`.

`fraction` (pair of numbers):
`ly:time-signature::calc-fraction`

A fraction.

`nested-fraction-mixed` (boolean):
`#t`

Whether a fractional term of a time signature is printed as a mixed number (e.g., '2 1/2') or as a common fraction (e.g., '5/2').

`nested-fraction-orientation` (symbol):
`'default`

A symbol describing the orientation of a fractional part of a time signature.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`note-dots-direction` (direction):
`0`

Whether the augmentation dots are shifted up or down (or not shifted) relative to the note head in a number-over-note time signature.

`note-staff-position` (number):
`-1`

The position of the note in a number-over-note time signature. See `staff-position`.

`senza-misura-stencil` (stencil):
`#f`

The symbol to print when `TimeSignature.time-signature` 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)
  (custos minimum-space . 0.5)
  (first-note semi-shrink-space . 2.0)
  (optional-material-start-bracket extra-space . 1.0)
  (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 "Grobs and their break-align symbols" in *Notation 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: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 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 774), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `pure-from-neighbor-interface` (page 825), and `time-signature-interface` (page 855).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.152 TrillPitchAccidental

The accidental of a pitched trill. See also `TrillPitchGroup` (page 743).

`TrillPitchAccidental` objects are created by the following engraver(s): `Pitched_trill_engraver` (page 499).

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 829).

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 761), `accidental-switch-interface` (page 762), `font-interface` (page 787), `grob-interface` (page 793), `inline-accidental-interface` (page 800), `item-interface` (page 802), `side-position-interface` (page 832), and `trill-pitch-accidental-interface` (page 856).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.153 TrillPitchGroup

An auxiliary grob to construct a pitched trill, aligning `TrillPitchAccidental` (page 742), `TrillPitchParentheses` (page 745), and `TrillPitchHead` (page 744), horizontally. See also `TrillSpanner` (page 746).

`TrillPitchGroup` objects are created by the following engraver(s): `Pitched_trill_engraver` (page 499).

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 829).

Y-extent (pair of numbers):
#<unpure-pure-container ly:axis-group-interface::height trill-pitch-group::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 764), grob-interface (page 793), item-interface (page 802), and side-position-interface (page 832).

This object is of class Item (characterized by item-interface (page 802)).

3.1.154 TrillPitchHead

The note head of a pitched trill. See also TrillPitchGroup (page 743).

TrillPitchHead objects are created by the following engraver(s): Pitched_trill_engraver (page 499).

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 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 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 829).

This object supports the following interface(s): `accidental-participating-head-interface` (page 762), `font-interface` (page 787), `grob-interface` (page 793), `item-interface` (page 802), `ledgered-interface` (page 806), `note-head-interface` (page 818), `pitched-trill-interface` (page 825), and `staff-symbol-referencer-interface` (page 843).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.155 TrillPitchParentheses

The parentheses of a pitched trill. See also `TrillPitchGroup` (page 743).

`TrillPitchParentheses` objects are created by the following engraver(s): `Pitched_trill_engraver` (page 499).

Standard settings:

`font-size` (number):
`-4`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.3`

Add this much extra space between objects that are next to each other.

`stencil` (stencil):
`parentheses-interface::print`
The symbol to print.

`stencils` (list):
`parentheses-interface::calc-parenthesis-stencils`
Multiple stencils, used as intermediate value.

`Y-extent` (pair of numbers):
`#<unpure-pure-container 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 787), `grob-interface` (page 793), `item-interface` (page 802), `parentheses-interface` (page 823), and `pitched-trill-interface` (page 825).

This object is of class Item (characterized by `item-interface` (page 802)).

3.1.156 TrillSpanner

A continued trill with a wiggly line (created with \startTrillSpan, not with \trill). See also `TrillPitchGroup` (page 743).

`TrillSpanner` objects are created by the following engraver(s): `Trill_spanner_engraver` (page 512).

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 #<program>
              0
              (#<program>
               0
               (#<program>
                "scripts.trill"))
              (#<program>
               0
               (#<program>
                "scripts.trill")))
        (stencil-offset 0 . -1)
        (attach-dir . 0))
  (left-broken (end-on-note . #t))
  (right (adjust-on-neighbor . #t)
         (attach-dir . -1)
         (end-on-accidental . #t)))
```
An alist of properties for determining attachments of spanners to edges.

`direction` (direction):
`1`
If `side-axis` is `0` (or `X`), then this property determines whether the object is placed `LEFT`, `CENTER` or `RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `UP`, `CENTER` or `DOWN`. Numerical values may also be used: `UP`=1, `DOWN`=-1, `LEFT`=-1, `RIGHT`=1, `CENTER`=0.

`left-bound-info` (alist, with symbols as keys):
`ly:horizontal-line-spanner::calc-left-bound-info`
An alist of properties for determining attachments of spanners to edges.

`outside-staff-priority` (number):
`50`
If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`padding` (dimension, in staff space):
`0.5`
Add this much extra space between objects that are next to each other.

`right-bound-info` (alist, with symbols as keys):
`ly:horizontal-line-spanner::calc-right-bound-info`
An alist of properties for determining attachments of spanners to edges.

`staff-padding` (dimension, in staff space):
`1.0`
Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

`stencil` (stencil):
`ly:line-spanner::print`
The symbol to print.

`style` (symbol):
`'trill`
This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`to-barline` (boolean):
`#t`
If true, the spanner will stop at the bar line just before it would otherwise stop.

`vertical-skylines` (pair of skylines):
`#<unpure-pure-container ly:grob::vertical-skylines-from-stencil 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 787), `grob-interface` (page 793), `horizontal-line-spanner-interface` (page 799), `line-interface` (page 807), `outside-staff-interface` (page 822), `side-position-interface` (page 832), `spanner-interface` (page 840), and `trill-spanner-interface` (page 856).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.157 TupletBracket

A tuplet bracket. See also `TupletNumber` (page 749).

`TupletBracket` objects are created by the following engraver(s): `Tuplet_engraver` (page 512).

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 ly:grob::vertical-skylines-from-stencil 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 793), `line-interface` (page 807), `outside-staff-interface` (page 822), `spanner-interface` (page 840), and `tuplet-bracket-interface` (page 856).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.158 TupletNumber

A tuplet number. See also `TupletBracket` (page 747).

`TupletNumber` objects are created by the following engraver(s): `Tuplet_engraver` (page 512).

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 829).

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 829).

This object supports the following interface(s): font-interface (page 787), grob-interface (page 793), outside-staff-interface (page 822), spanner-interface (page 840), text-interface (page 850), and tuplet-number-interface (page 858).

This object is of class Spanner (characterized by spanner-interface (page 840)).

3.1.159 UnaCordaPedal

An una corda pedal mark. See also UnaCordaPedalLineSpanner (page 752), SostenutoPedal (page 702), SustainPedal (page 722), and PianoPedalBracket (page 684).

UnaCordaPedal objects are created by the following engraver(s): Piano_pedal_engraver (page 498).

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 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 829).

Y-extent (pair of numbers):
#<unpure-pure-container 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 787), grob-interface (page 793), item-interface (page 802), piano-pedal-script-interface (page 825), self-alignment-interface (page 829), and text-interface (page 850).

This object is of class Item (characterized by item-interface (page 802)).

3.1.160 UnaCordaPedalLineSpanner

An auxiliary grob providing a baseline to align consecutive UnaCordaPedal (page 750), grobs vertically.

UnaCordaPedalLineSpanner objects are created by the following engraver(s): Piano_pedal_align_engraver (page 498).

Standard settings:

axes (list):
'(1)

List of axis numbers. In the case of alignment grobs, this should contain only one number.

direction (direction):
-1

If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

minimum-space (dimension, in staff space):
1.0

Minimum distance that the victim should move (after padding).

outside-staff-priority (number):
1000

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller outside-staff-priority is closer to the staff.

padding (dimension, in staff space):
1.2

Add this much extra space between objects that are next to each other.

side-axis (number):
1

If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

staff-padding (dimension, in staff space):
1.2

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

vertical-skylines (pair of skylines):
#<unpure-pure-container ly:grob::vertical-skylines-from-element-stencils 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 ly:axis-group-interface::height ly:axis-group-interface::pure-height >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `axis-group-interface` (page 764), `grob-interface` (page 793), `outside-staff-interface` (page 822), `piano-pedal-interface` (page 825), `side-position-interface` (page 832), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.161 VaticanaLigature

A grob to display a melisma (ligature) as used in Gregorian chant. See also `KievanLigature` (page 640), `MensuralLigature` (page 658), and `LigatureBracket` (page 646).

`VaticanaLigature` objects are created by the following engraver(s): `Vaticana_ligature_engraver` (page 513).

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 787), `grob-interface` (page 793), `spanner-interface` (page 840), and `vaticana-ligature-interface` (page 859).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.162 VerticalAlignment

A top-level auxiliary grob to stack groups (staves, lyrics lines, etc.). See also `StaffGrouper` (page 710), and `VerticalAxisGroup` (page 754).

`VerticalAlignment` objects are created by the following engraver(s): `Vertical_align_engraver` (page 513).

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 ly:axis-group-interface::height ly:axis-group-interface::pure-height >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): `align-interface` (page 763), `axis-group-interface` (page 764), `grob-interface` (page 793), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.163 VerticalAxisGroup

An auxiliary grob to group everything contained in a context like `Staff` (page 314), `Lyrics` (page 223), `Dynamics` (page 133), etc. See also `StaffGrouper` (page 710), and `VerticalAlignment` (page 753).

`VerticalAxisGroup` objects are created by the following engraver(s): `Axis_group_engraver` (page 458).

Standard settings:

`axes` (list):
`'(1)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`default-staff-staff-spacing` (list):
`'((basic-distance . 9) (minimum-distance . 8) (padding . 1))`

The settings to use for `staff-staff-spacing` when it is unset, for ungrouped staves and for grouped staves that do not have the relevant `StaffGrouper` property set (`staff-staff-spacing` or `staffgroup-staff-spacing`).

`nonstaff-unrelatedstaff-spacing` (alist, with symbols as keys):
`'((padding . 0.5))`

The spacing alist controlling the distance between the current non-staff line and the nearest staff in the opposite direction from `staff-affinity`, if there are no other non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. See `staff-staff-spacing` for a description of the alist structure.

`outside-staff-placement-directive` (symbol):
`'left-to-right-polite`

One of four directives telling how outside staff objects should be placed.

- `left-to-right-greedy` – Place each successive grob from left to right.
- `left-to-right-polite` – Place a grob from left to right only if it does not potentially overlap with another grob that has been placed on a pass through a grob array. If there is overlap, do another pass to determine placement.
- `right-to-left-greedy` – Same as `left-to-right-greedy`, but from right to left.
- `right-to-left-polite` – Same as `left-to-right-polite`, but from right to left.

`show-vertical-skylines` (boolean):
`grob::show-skylines-if-debug-skylines-set`

If true, print this grob's vertical skylines. This is meant for debugging purposes.

`skyline-horizontal-padding` (number):
`0.1`

For determining the vertical distance between two staves, it is possible to have a configuration which would result in a tight interleaving of grobs from the top staff and the bottom staff. The larger this parameter is, the farther apart the staves are placed in such a configuration.

`staff-staff-spacing` (alist, with symbols as keys):
`#<unpure-pure-container ly:axis-group-interface::calc-staff-staff-spacing ly:axis-group-interface::calc-pure-staff-staff-spacing >`

When applied to a staff-group's `StaffGrouper` grob, this spacing alist controls the distance between consecutive staves within the staff-group. When applied to a staff's `VerticalAxisGroup` grob, it controls the distance between the staff and the nearest staff below it in the same system, replacing any settings inherited from the `StaffGrouper` grob of the containing staff-group, if there is one. This property remains in effect even when non-staff lines appear between staves. The alist can contain the following keys:

- `basic-distance` – the vertical distance, measured in staff-spaces, between the reference points of the two items when no collisions would result, and no stretching or compressing is in effect.
- `minimum-distance` – the smallest allowable vertical distance, measured in staff-spaces, between the reference points of the two items, when compressing is in effect.
- `padding` – the minimum required amount of unobstructed vertical whitespace between the bounding boxes (or skylines) of the two items, measured in staff-spaces.
- `stretchability` – a unitless measure of the dimension's relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result).

`vertical-skylines` (pair of skylines):
`ly:hara-kiri-group-spanner::calc-skylines`

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object's reference point.

`Y-extent` (pair of numbers):
`#<unpure-pure-container ly:hara-kiri-group-spanner::y-extent ly:hara-kiri-group-spanner::pure-height >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`ly:hara-kiri-group-spanner::force-hara-kiri-callback`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `axis-group-interface` (page 764), `grob-interface` (page 793), `hara-kiri-group-spanner-interface` (page 798), `outside-staff-axis-group-interface` (page 821), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.164 `VoiceFollower`

A line to indicate staff changes of a voice.

`VoiceFollower` objects are created by the following engraver(s): `Note_head_line_engraver` (page 493).

Standard settings:

`after-line-breaking` (boolean):
`ly:spanner::kill-zero-spanned-time`

Dummy property, used to trigger callback for `after-line-breaking`.

`bound-details` (alist, with symbols as keys):
```
'((right (attach-dir . 0) (padding . 1.5))
  (left (attach-dir . 0) (padding . 1.5)))
```

An alist of properties for determining attachments of spanners to edges.

gap (dimension, in staff space):
`0.5`

Size of a gap in a variable symbol.

`left-bound-info` (alist, with symbols as keys):
`ly:line-spanner::calc-left-bound-info`

An alist of properties for determining attachments of spanners to edges.

`normalized-endpoints` (pair):
`ly:spanner::calc-normalized-endpoints`

Represents left and right placement over the total spanner, where the width of the spanner is normalized between 0 and 1.

`right-bound-info` (alist, with symbols as keys):
`ly:line-spanner::calc-right-bound-info`

An alist of properties for determining attachments of spanners to edges.

`stencil` (stencil):
`ly:line-spanner::print`

The symbol to print.

`style` (symbol):
`'line`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

This object supports the following interface(s): `grob-interface` (page 793), `line-interface` (page 807), `line-spanner-interface` (page 808), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.165 VoltaBracket

A volta bracket. See also `VoltaBracketSpanner` (page 758).

`VoltaBracket` objects are created by the following engraver(s): `Volta_engraver` (page 513).

Standard settings:

`baseline-skip` (dimension, in staff space):
`1.7`

Distance between base lines of multiple lines of text.

`direction` (direction):
`1`

If `side-axis` is `0` (or `X`), then this property determines whether the object is placed `LEFT`, `CENTER` or `RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `UP`, `CENTER` or `DOWN`. Numerical values may also be used: `UP`=`1`, `DOWN`=`-1`, `LEFT`=`-1`, `RIGHT`=`1`, `CENTER`=`0`.

`edge-height` (pair):
`'(2.0 . 2.0)`

A pair of numbers specifying the heights of the vertical edges: `(`*`left-height`* `.` *`right-height`*`)`.

`font-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.

`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 ly:grob::vertical-skylines-from-stencil 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 ly:grob::stencil-height volta-bracket-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): `font-interface` (page 787), `grob-interface` (page 793), `horizontal-bracket-interface` (page 799), `line-interface` (page 807), `side-position-interface` (page 832), `spanner-interface` (page 840), `text-interface` (page 850), `volta-bracket-interface` (page 860), and `volta-interface` (page 861).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.166 `VoltaBracketSpanner`

An auxiliary grob providing a baseline to align consecutive `VoltaBracket` (page 757), grobs vertically.

`VoltaBracketSpanner` objects are created by the following engraver(s): `Volta_engraver` (page 513).

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 ly:grob::vertical-skylines-from-element-stencils 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 ly:axis-group-interface::height ly:axis-group-interface::pure-height >`

Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

`Y-offset` (number):
`#<unpure-pure-container ly:side-position-interface::y-aligned-side ly:side-position-interface::pure-y-aligned-side >`

The vertical amount that this object is moved relative to its Y-parent.

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 829).

This object supports the following interface(s): `axis-group-interface` (page 764), `grob-interface` (page 793), `outside-staff-interface` (page 822), `side-position-interface` (page 832), `spanner-interface` (page 840), and `volta-interface` (page 861).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

3.1.167 VowelTransition

A vowel transition in lyrics. See also LyricHyphen (page 648).

VowelTransition objects are created by the following engraver(s): Hyphen_engraver (page 483).

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 note heads.

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 ly:grob::vertical-skylines-from-stencil
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 829).

This object supports the following interface(s): `grob-interface` (page 793), `horizontal-line-spanner-interface` (page 799), `line-interface` (page 807), `lyric-interface` (page 811), and `spanner-interface` (page 840).

This object is of class Spanner (characterized by `spanner-interface` (page 840)).

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 533), `AccidentalCautionary` (page 534), `AccidentalSuggestion` (page 536), `AmbitusAccidental` (page 540), and `TrillPitchAccidental` (page 742).

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): ApproximatePitchNoteHead (page 542), NoteHead (page 670), and TrillPitchHead (page 744).

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 535).

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 536).

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 533), AccidentalCautionary (page 534), AccidentalSuggestion (page 536), AmbitusAccidental (page 540), BalloonText (page 545), BassFigure (page 553), ChordName (page 573),

CombineTextScript (page 585), GridChordName (page 623), HorizontalBracketText (page 629), InstrumentName (page 630), InstrumentSwitch (page 631), KeyCancellation (page 634), KeySignature (page 637), MeasureSpanner (page 656), NoteName (page 671), RehearsalMark (page 685), TextMark (page 731), TextScript (page 733), and TrillPitchAccidental (page 742).

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 553), and VerticalAlignment (page 753).

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 *Staff*.StaffSymbol.thickness).

Internal properties:

note-heads (array of grobs)
: An array of note head grobs.

This grob interface is used in the following graphical object(s): Ambitus (page 538), AmbitusLine (page 540), and AmbitusNoteHead (page 541).

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 t value, an ending t-value, a dash-fraction, and a dash-period.

line-thickness (number)
: For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *Staff*.StaffSymbol.thickness).

positions (pair of numbers)
: Pair of staff coordinates (*start* . *end*), where *start* and *end* are vertical positions in staff-space units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

protrusion (number)
: In a bracket indicating non-arpeggio or optional material, the length of the horizontal edges.

script-priority (number)
: A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

thickness (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *Staff*.StaffSymbol.thickness).

Internal properties:

stems (array of grobs)
: An array of stem objects.

This grob interface is used in the following graphical object(s): Arpeggio (page 544).

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 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 538), `BassFigureAlignment` (page 553), `BassFigureAlignmentPositioning` (page 554), `BassFigureLine` (page 556), `BreakAlignGroup` (page 563), `BreakAlignment` (page 564), `CenteredBarNumberLineSpanner` (page 570), `DotColumn` (page 600), `DynamicLineSpanner` (page 607), `NonMusicalPaperColumn` (page 667), `NoteCollision` (page 668), `NoteColumn` (page 669), `PaperColumn` (page 677), `SostenutoPedalLineSpanner` (page 704), `SustainPedalLineSpanner` (page 723), `System` (page 724), `TrillPitchGroup` (page 743), `UnaCordaPedalLineSpanner` (page 752), `VerticalAlignment` (page 753), `VerticalAxisGroup` (page 754), and `VoltaBracketSpanner` (page 758).

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 545), and `Footnote` (page 618).

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)
: 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:

`allow-span-bar-above` (boolean)
: If false, no inter-staff bar line will be created above this item.

`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 547), and `SpanBar` (page 706).

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 551), `CenteredBarNumber` (page 569), and `CenteredBarNumberLineSpanner` (page 570).

3.2.13 bass-figure-alignment-interface

Align a bass figure.

This grob interface is used in the following graphical object(s): `BassFigureAlignment` (page 553).

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 553).

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)
Avoid beam collisions only with grobs of 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 533, 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 761, 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 'floating' beams in a two-stem 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 note heads.

`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 557).

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 560).

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 533, 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 761, 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):
`ApproximatePitchNoteHead` (page 542), `BendSpanner` (page 561), `NoteColumn` (page 669), `NoteHead` (page 670), and `TabNoteHead` (page 729).

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 641), `PhrasingSlur` (page 682), `RepeatTie` (page 688), `Slur` (page 700), and `Tie` (page 737).

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 "Grobs and their break-align symbols" in *Notation 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 551), `CodaMark` (page 583), `JumpScript` (page 633), `LyricRepeatCount` (page 649), `MetronomeMark` (page 658), `RehearsalMark` (page 685), `SectionLabel` (page 693), `SegnoMark` (page 695), and `TextMark` (page 731).

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 "Grobs and their break-align symbols" in *Notation 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 538), `AmbitusAccidental` (page 540), `BarLine` (page 547), `BreakAlignGroup` (page 563), `BreathingSign` (page 565), `Clef` (page 577), `CueClef` (page 589), `CueEndClef` (page 592), `Custos` (page 595), `Divisio` (page 597), `DoublePercentRepeat` (page 602), `KeyCancellation` (page 634), `KeySignature` (page 637), `LeftEdge` (page 643), `OptionalMaterialBracket` (page 673), `SignumRepetitionis` (page 697), `SpanBar` (page 706), `StaffEllipsis` (page 708), and `TimeSignature` (page 739).

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. `break-alignable-interface` (page 774), and
3. `break-aligned-interface` (page 774).

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).

The break-align symbols used by the various grobs are listed in Section "Grobs and their break-align symbols" in *Notation Reference*.

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 "Grobs and their break-align symbols" in *Notation Reference* and 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))
```

  The same result can be achieved more conveniently by:

```
\breakAlignInsert time-signature before clef
```

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 564).

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 565), and Divisio (page 597).

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 568).

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 569).

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 570).

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 569), MeasureCounter (page 653), and PercentRepeat (page 679).

3.2.27 chord-bracket-interface

Functions and settings for drawing a vertical bracket, such as for non-arpeggiato, non-divisi, or optional material.

User-settable properties:

`line-thickness` (number)
: For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *Staff*`.StaffSymbol.thickness`).

`positions` (pair of numbers)
: Pair of staff coordinates (*start* . *end*), where *start* and *end* are vertical positions in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`protrusion` (number)
: In a bracket indicating non-arpeggio or optional material, the length of the horizontal edges.

`script-priority` (number)
: A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *Staff*`.StaffSymbol.thickness`).

Internal properties:

`stems` (array of grobs)
: An array of stem objects.

This grob interface is used in the following graphical object(s): `ChordBracket` (page 572).

3.2.28 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 573), and `FretBoard` (page 620).

3.2.29 chord-slur-interface

Functions and settings for drawing a vertical slur.

User-settable properties:

`dash-definition` (pair)
: List of `dash-elements` defining the dash structure. Each `dash-element` has a starting t value, an ending t-value, a `dash-fraction`, and a `dash-period`.

`line-thickness` (number)
: For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`positions` (pair of numbers)
: Pair of staff coordinates (*`start . end`*), where *start* and *end* are vertical positions in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`script-priority` (number)
: A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`stems` (array of grobs)
: An array of stem objects.

This grob interface is used in the following graphical object(s): `ChordSlur` (page 574).

3.2.30 `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 576).

3.2.31 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 577), `CueClef` (page 589), and `CueEndClef` (page 592).

3.2.32 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 580).

3.2.33 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 582).

3.2.34 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 582).

3.2.35 coda-mark-interface

A coda sign.

This grob interface is used in the following graphical object(s): `CodaMark` (page 583).

3.2.36 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 587).

3.2.37 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 588).

3.2.38 custos-interface

A custos object. style can have four valid values: mensural, vaticana, medicaea, and hufnagel. vaticana 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 595).

3.2.39 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 600).

3.2.40 dots-interface

The dots to go with a note head 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 600).

3.2.41 duration-line-interface

A line lasting for the duration of a rhythmic event.

If `bound-details.right.end-style` is set to `'arrow`, end the duration line with a right-pointing arrow. If set to `'hook`, end it with a hook.

The following properties may be set in the `details` list.

`extra-dot-padding`
: Padding to apply if a `DotColumn` grob is present and the `start-at-dot` sub-property is enabled.

`hook-direction`
: The direction of the hook ending the duration line.

`hook-height`
: The height of the hook ending the duration line.

`hook-thickness`
: The thickness of the hook ending the duration line.

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 533, 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 761, 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 605).

3.2.42 dynamic-interface

Any kind of loudness sign.

This grob interface is used in the following graphical object(s): DynamicLineSpanner (page 607), DynamicText (page 609), DynamicTextSpanner (page 611), and Hairpin (page 626).

3.2.43 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 607).

3.2.44 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 609).

3.2.45 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 611).

3.2.46 enclosing-bracket-interface

Brackets alongside bass figures.

User-settable properties:

bracket-flare (pair of numbers)
: A pair of numbers specifying how much edges of brackets should slant outward. Value 0.0 means straight edges.

dashed-edge (boolean)
: If set, the bracket edges are dashed like the rest of the bracket.

`edge-height` (pair)
: A pair of numbers specifying the heights of the vertical edges: `(`*`left-height`* `.` *`right-height`*`)`.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`shorten-pair` (pair of numbers)
: The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

This grob interface is used in the following graphical object(s): `BassFigureBracket` (page 555).

3.2.47 episema-interface

An episema line.

This grob interface is used in the following graphical object(s): `Episema` (page 612).

3.2.48 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 556).

3.2.49 finger-glide-interface

The line between `Fingering` grobs indicating a glide with that finger.

The property `style` may take the following symbols.

`line`
: A simple connecting line.

`dashed-line`
: Print a dashed line. Customizable with settings for `dash-fraction` and `dash-period`.

`dotted-line`
: Print a dotted line.

`stub-right`
: The printed line is limited to a certain amount right before its right bound. This amount is configurable by a suitable setting for `bound-details.right.right-stub-length`.

`stub-left`
The printed line is limited to a certain amount right after its left bound. The amount is configurable by a suitable setting for `bound-details.right.left-stub-length`.

`stub-both`
The printed line combines the settings of `stub-left` and `stub-right`.

`zigzag`
A zigzag line, configurable with suitable settings for `zigzag-width` and `zigzag-length`.

`trill`
A trill style line.

`bow`
A bow style line. The orientation of the bow may be tweaked with a suitable setting of `details.bow-direction`.

User-settable properties:

`dash-fraction` (number)
Size of the dashes, relative to `dash-period`. Should be between `0.1` and `1.0` (continuous line). If set to `0.0`, a dotted line is produced

`dash-period` (number)
The length of one dash together with whitespace. If negative, no line is drawn at all.

`details` (alist, with symbols as keys)
An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 533, 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 761, 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 613).

3.2.50 `finger-interface`

A fingering instruction.

This grob interface is used in the following graphical object(s): `Fingering` (page 615).

3.2.51 `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 617).

3.2.52 `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 617).

3.2.53 `font-interface`

Any symbol that is typeset through fixed sets of glyphs, (i.e., fonts).

User-settable properties:

`font-encoding` (symbol)
: The font encoding is the broadest category for selecting a font. Currently, only LilyPond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`font-family` (symbol)
: The font family is the broadest category for selecting text fonts. Options include `serif`, `sans` 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 (or extralight), light, semilight (or demilight), book, normal (or regular), medium, semibold (or demibold), bold, ultrabold (or extrabold), heavy (or black), and ultraheavy (or ultrablack or extrablack).

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.

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 533), AccidentalCautionary (page 534), AccidentalSuggestion (page 536), AmbitusAccidental (page 540), AmbitusLine (page 540), AmbitusNoteHead (page 541), ApproximatePitchNoteHead (page 542), Arpeggio (page 544), BalloonText (page 545), BarLine (page 547), BarNumber (page 551), BassFigure (page 553), BendSpanner (page 561), BreathingSign (page 565), CaesuraScript (page 568), CenteredBarNumber (page 569), ChordBracket (page 572), ChordName (page 573), ChordSlur (page 574), Clef (page 577), ClefModifier (page 580), CodaMark (page 583), CombineTextScript (page 585), CueClef (page 589), CueEndClef (page 592), Custos (page 595), Divisio (page 597), Dots (page 600), DoublePercentRepeat (page 602), DoublePercentRepeatCounter (page 603), DoubleRepeatSlash (page 604), DurationLine (page 605), DynamicText (page 609), DynamicTextSpanner (page 611), Episema (page 612), FingerGlideSpanner (page 613), Fingering (page 615), Flag (page 617), Footnote (page 618), FretBoard (page 620), Glissando (page 622), GridChordName (page 623), HorizontalBracketText (page 629), InstrumentName (page 630), InstrumentSwitch (page 631), JumpScript (page 633), KeyCancellation (page 634), KeySignature (page 637), KievanLigature (page 640), LyricHyphen (page 648), LyricRepeatCount (page 649), LyricText (page 651), MeasureCounter (page 653), MeasureSpanner (page 656), MensuralLigature (page 658), MetronomeMark (page 658), MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), MultiMeasureRestText (page 665), NonMusicalPaperColumn (page 667), NoteHead (page 670), NoteName (page 671), OttavaBracket (page 676), PaperColumn (page 677), Parentheses (page 678),

PercentRepeat (page 679), PercentRepeatCounter (page 680), RehearsalMark (page 685), Rest (page 689), Script (page 691), SectionLabel (page 693), SegnoMark (page 695), SignumRepetitionis (page 697), SostenutoPedal (page 702), SpanBar (page 706), StaffEllipsis (page 708), StanzaNumber (page 714), StringNumber (page 718), StrokeFinger (page 720), SustainPedal (page 722), SystemStartBrace (page 726), SystemStartBracket (page 727), SystemStartSquare (page 728), TabNoteHead (page 729), TextMark (page 731), TextScript (page 733), TextSpanner (page 735), TimeSignature (page 739), TrillPitchAccidental (page 742), TrillPitchHead (page 744), TrillPitchParentheses (page 745), TrillSpanner (page 746), TupletNumber (page 749), UnaCordaPedal (page 750), VaticanaLigature (page 753), and VoltaBracket (page 757).

3.2.54 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 618).

3.2.55 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.
    - barre-thickness – Thickness of barre line, in multiples of dot-radius. Only defined for barre-type=straight. Default value 1.

- `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-overhang` – Extension of string lines beyond last fret line, in multiples of `fret-distance`. Default value 1.
- `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 620).

3.2.56 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 622).

3.2.57 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 623).

3.2.58 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 neighbor head. `context-info` holds for each head such information about the left and right neighbor, encoded as a bit mask.

`deminutum` (boolean)
: Is this neume diminished?

`descendens` (boolean)
: Is this neume of descendant 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): `ApproximatePitchNoteHead` (page 542), and `NoteHead` (page 670).

3.2.59 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 623).

3.2.60 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 624).

3.2.61 grid-point-interface

A spanning point for grid lines.

This grob interface is used in the following graphical object(s): `GridPoint` (page 625).

3.2.62 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 `NoteCollision` (page 668), 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 underlying material, if the grob is visible. A number indicates how far the white background extends beyond the bounding box of the grob as a multiple of the staff-line thickness. The `LyricHyphen` grob uses a special implementation of whiteout: A positive number indicates how far the white background extends beyond the bounding box in multiples of `line-thickness`. The shape of the background is determined by `whiteout-style`.

Usually `#f` by default. If `whiteout-color` is set, use this color instead of white for the background.

`whiteout-color` (color)
The background color used if property `whiteout` is set.

`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 829).

`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 829).

Internal properties:

`axis-group-parent-X` (graphical (layout) object)
Containing X axis group.

`axis-group-parent-Y` (graphical (layout) object)
: Containing Y axis group.

`cause` (any type)
: Any kind of causation objects (i.e., music, or perhaps translator) that was the cause for this grob.

`cross-staff` (boolean)
: True for grobs whose `Y-extent` depends on inter-staff spacing. The extent is measured relative to the grobs's parent staff (more generally, its `VerticalAxisGroup`) so this boolean flags grobs that are not rigidly fixed to their parent staff. Beams that join notes from two staves are `cross-staff`. Grobs that are positioned around such beams are also `cross-staff`. Grobs that are grouping objects, however, like `VerticalAxisGroups` will not in general be marked `cross-staff` when some of the members of the group are `cross-staff`.

`interfaces` (list)
: A list of symbols indicating the interfaces supported by this object. It is initialized from the `meta` field.

`meta` (alist, with symbols as keys)
: Provide meta information. It is an alist with the entries `name` and `interfaces`.

`pure-Y-offset-in-progress` (boolean)
: A debugging aid for catching cyclic dependencies.

`staff-symbol` (graphical (layout) object)
: The staff symbol grob that we are in.

`vertically-spanning-surrogate` (graphical (layout) object)
: When an engraver hides a shorter instance of a vertically spanning grob (e.g., an arpeggio sign) to allow a taller instance to appear, this property may be set in the shorter instance to allow navigation to the taller instance.

This grob interface is used in the following graphical object(s): `Accidental` (page 533), `AccidentalCautionary` (page 534), `AccidentalPlacement` (page 535), `AccidentalSuggestion` (page 536), `Ambitus` (page 538), `AmbitusAccidental` (page 540), `AmbitusLine` (page 540), `AmbitusNoteHead` (page 541), `ApproximatePitchNoteHead` (page 542), `Arpeggio` (page 544), `BalloonText` (page 545), `BarLine` (page 547), `BarNumber` (page 551), `BassFigure` (page 553), `BassFigureAlignment` (page 553), `BassFigureAlignmentPositioning` (page 554), `BassFigureBracket` (page 555), `BassFigureContinuation` (page 556), `BassFigureLine` (page 556), `Beam` (page 557), `BendAfter` (page 560), `BendSpanner` (page 561), `BreakAlignGroup` (page 563), `BreakAlignment` (page 564), `BreathingSign` (page 565), `CaesuraScript` (page 568), `CenteredBarNumber` (page 569), `CenteredBarNumberLineSpanner` (page 570), `ChordBracket` (page 572), `ChordName` (page 573), `ChordSlur` (page 574), `ChordSquare` (page 576), `Clef` (page 577), `ClefModifier` (page 580), `ClusterSpanner` (page 582), `ClusterSpannerBeacon` (page 582), `CodaMark` (page 583), `CombineTextScript` (page 585), `ControlPoint` (page 587), `ControlPolygon` (page 588), `CueClef` (page 589), `CueEndClef` (page 592), `Custos` (page 595), `Divisio` (page 597), `DotColumn` (page 600), `Dots` (page 600), `DoublePercentRepeat` (page 602), `DoublePercentRepeatCounter` (page 603), `DoubleRepeatSlash` (page 604), `DurationLine` (page 605), `DynamicLineSpanner` (page 607), `DynamicText` (page 609), `DynamicTextSpanner` (page 611), `Episema` (page 612), `FingerGlideSpanner` (page 613), `Fingering` (page 615), `FingeringColumn` (page 617), `Flag` (page 617), `Footnote` (page 618), `FretBoard` (page 620), `Glissando` (page 622), `GraceSpacing` (page 623), `GridChordName` (page 623), `GridLine` (page 624), `GridPoint` (page 625), `Hairpin`

(page 626), HorizontalBracket (page 627), HorizontalBracketText (page 629), InstrumentName (page 630), InstrumentSwitch (page 631), JumpScript (page 633), KeyCancellation (page 634), KeySignature (page 637), KievanLigature (page 640), LaissezVibrerTie (page 641), LaissezVibrerTieColumn (page 642), LedgerLineSpanner (page 643), LeftEdge (page 643), LigatureBracket (page 646), LyricExtender (page 647), LyricHyphen (page 648), LyricRepeatCount (page 649), LyricSpace (page 651), LyricText (page 651), MeasureCounter (page 653), MeasureGrouping (page 655), MeasureSpanner (page 656), MelodyItem (page 658), MensuralLigature (page 658), MetronomeMark (page 658), MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), MultiMeasureRestText (page 665), NonMusicalPaperColumn (page 667), NoteCollision (page 668), NoteColumn (page 669), NoteHead (page 670), NoteName (page 671), NoteSpacing (page 672), OptionalMaterialBracket (page 673), OttavaBracket (page 676), PaperColumn (page 677), Parentheses (page 678), PercentRepeat (page 679), PercentRepeatCounter (page 680), PhrasingSlur (page 682), PianoPedalBracket (page 684), RehearsalMark (page 685), RepeatSlash (page 687), RepeatTie (page 688), RepeatTieColumn (page 689), Rest (page 689), RestCollision (page 690), Script (page 691), ScriptColumn (page 692), ScriptRow (page 693), SectionLabel (page 693), SegnoMark (page 695), SignumRepetitionis (page 697), Slur (page 700), SostenutoPedal (page 702), SostenutoPedalLineSpanner (page 704), SpacingSpanner (page 705), SpanBar (page 706), SpanBarStub (page 707), StaffEllipsis (page 708), StaffGrouper (page 710), StaffHighlight (page 711), StaffSpacing (page 712), StaffSymbol (page 713), StanzaNumber (page 714), Stem (page 715), StemStub (page 717), StemTremolo (page 717), StringNumber (page 718), StrokeFinger (page 720), SustainPedal (page 722), SustainPedalLineSpanner (page 723), System (page 724), SystemStartBar (page 725), SystemStartBrace (page 726), SystemStartBracket (page 727), SystemStartSquare (page 728), TabNoteHead (page 729), TextMark (page 731), TextScript (page 733), TextSpanner (page 735), Tie (page 737), TieColumn (page 739), TimeSignature (page 739), TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), TrillPitchParentheses (page 745), TrillSpanner (page 746), TupletBracket (page 747), TupletNumber (page 749), UnaCordaPedal (page 750), UnaCordaPedalLineSpanner (page 752), VaticanaLigature (page 753), VerticalAlignment (page 753), VerticalAxisGroup (page 754), VoiceFollower (page 756), VoltaBracket (page 757), VoltaBracketSpanner (page 758), and VowelTransition (page 760).

3.2.63 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 626).

3.2.64 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 754).

3.2.65 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.

`edge-height` (pair)
: A pair of numbers specifying the heights of the vertical edges: `(`*`left-height`* `.` *`right-height`*`)`.

`shorten-pair` (pair of numbers)
: The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

Internal properties:

`bracket-text` (graphical (layout) object)
: A pointer to the text grob of 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 627), `OttavaBracket` (page 676), and `VoltaBracket` (page 757).

3.2.66 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 629).

3.2.67 horizontal-line-spanner-interface

This interface is a subset of the `line-spanner-interface` (page 808), for use with line spanners that are always horizontal (such as crescendo spanners). The `details.Y` subproperty is irrelevant. Grobs having this interface can be side-positioned vertically.

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.

`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): `BassFigureContinuation` (page 556), `DurationLine` (page 605), `DynamicTextSpanner` (page 611), `Episema` (page 612), `TextSpanner` (page 735), `TrillSpanner` (page 746), and `VowelTransition` (page 760).

3.2.68 `inline-accidental-interface`

An inlined accidental (i.e., normal accidentals, cautionary accidentals).

This grob interface is used in the following graphical object(s): `Accidental` (page 533), `AccidentalCautionary` (page 534), and `TrillPitchAccidental` (page 742).

3.2.69 `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`.
  - `barre-thickness` – Thickness of barre line, in multiples of `dot-radius`. Only defined for `barre-type=straight`. Default value 1.

- `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-overhang` – Extension of string lines beyond last fret line, in multiples of `fret-distance`. Default value 1.
- `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.

`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 733).

3.2.70 item-interface

Grobs can be distinguished in their role in the horizontal spacing. Many grobs define constraints on the spacing by their sizes, for example, note heads, clefs, stems, and all other symbols with a fixed shape. These grobs form a subtype called `Item`.

Some items need special treatment for line breaking. For example, a clef is normally only printed at the start of a line (i.e., after a line break). To model this, 'breakable' items (clef, key signature, bar lines, etc.) are copied twice. Then we have three versions of each breakable item: one version if there is no line break, one version that is printed before the line break (at the end of a system), and one version that is printed after the line break.

Whether these versions are visible and take up space is determined by the outcome of the `break-visibility` grob property, which is a function taking a direction (`-1`, `0` or `1`) as an argument. It returns a cons of booleans, signifying whether this grob should be transparent and have no extent.

The following variables for `break-visibility` are predefined:

grob will show:	before break	no break	after break
all-invisible	no	no	no
begin-of-line-visible	no	no	yes
end-of-line-visible	yes	no	no
all-visible	yes	yes	yes
begin-of-line-invisible	yes	yes	no
end-of-line-invisible	no	yes	yes
center-invisible	yes	no	yes

User-settable properties:

`break-visibility` (vector)
: A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`extra-spacing-height` (pair of numbers)
: In the horizontal spacing problem, we increase the height of each item by this amount (by adding the 'car' to the bottom of the item and adding the 'cdr' to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to `(-inf.0 . +inf.0)`.

`extra-spacing-width` (pair of numbers)
: In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

`non-musical` (boolean)
: True if the grob belongs to a `NonMusicalPaperColumn`.

This grob interface is used in the following graphical object(s): `Accidental` (page 533), `AccidentalCautionary` (page 534), `AccidentalPlacement` (page 535), `AccidentalSuggestion` (page 536), `Ambitus` (page 538), `AmbitusAccidental` (page 540), `AmbitusLine` (page 540), `AmbitusNoteHead` (page 541), `ApproximatePitchNoteHead` (page 542), `Arpeggio` (page 544), `BarLine` (page 547), `BarNumber` (page 551), `BassFigure` (page 553), `BassFigureBracket` (page 555), `BreakAlignGroup` (page 563), `BreakAlignment` (page 564), `BreathingSign` (page 565), `CaesuraScript` (page 568), `ChordBracket` (page 572), `ChordName` (page 573), `ChordSlur` (page 574), `Clef` (page 577), `ClefModifier` (page 580), `ClusterSpannerBeacon` (page 582), `CodaMark` (page 583), `CombineTextScript` (page 585), `CueClef` (page 589), `CueEndClef` (page 592), `Custos` (page 595), `Divisio` (page 597), `DotColumn` (page 600), `Dots` (page 600), `DoublePercentRepeat` (page 602), `DoublePercentRepeatCounter` (page 603), `DoubleRepeatSlash` (page 604), `DynamicText`

(page 609), Fingering (page 615), FingeringColumn (page 617), Flag (page 617), FretBoard (page 620), GridLine (page 624), GridPoint (page 625), InstrumentSwitch (page 631), JumpScript (page 633), KeyCancellation (page 634), KeySignature (page 637), LaissezVibrerTie (page 641), LaissezVibrerTieColumn (page 642), LeftEdge (page 643), LyricRepeatCount (page 649), LyricText (page 651), MelodyItem (page 658), MetronomeMark (page 658), NonMusicalPaperColumn (page 667), NoteCollision (page 668), NoteColumn (page 669), NoteHead (page 670), NoteName (page 671), NoteSpacing (page 672), OptionalMaterialBracket (page 673), PaperColumn (page 677), RehearsalMark (page 685), RepeatSlash (page 687), RepeatTie (page 688), RepeatTieColumn (page 689), Rest (page 689), RestCollision (page 690), Script (page 691), ScriptColumn (page 692), ScriptRow (page 693), SectionLabel (page 693), SegnoMark (page 695), SignumRepetitionis (page 697), SostenutoPedal (page 702), SpanBar (page 706), SpanBarStub (page 707), StaffEllipsis (page 708), StaffSpacing (page 712), StanzaNumber (page 714), Stem (page 715), StemStub (page 717), StemTremolo (page 717), StringNumber (page 718), StrokeFinger (page 720), SustainPedal (page 722), TabNoteHead (page 729), TextMark (page 731), TextScript (page 733), TimeSignature (page 739), TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillPitchHead (page 744), TrillPitchParentheses (page 745), and UnaCordaPedal (page 750).

In addition, this interface is supported conditionally by the following objects depending on their class: BalloonText (page 545), ControlPoint (page 587), ControlPolygon (page 588), Footnote (page 618), and Parentheses (page 678).

3.2.71 jump-script-interface

A jump instruction, e.g., *D.S.*.

This grob interface is used in the following graphical object(s): JumpScript (page 633).

3.2.72 key-cancellation-interface

A key cancellation.

This grob interface is used in the following graphical object(s): KeyCancellation (page 634).

3.2.73 key-signature-interface

A group of accidentals, to be printed as signature sign.

User-settable properties:

`alteration-alist` (association list (list of pairs))
List of `(pitch . accidental)` pairs for key signature.

`alteration-glyph-name-alist` (association list (list of pairs))
An alist of key-string pairs.

`flat-positions` (list)
Flats in key signatures are placed within the specified ranges of staff positions. The general form is a list of pairs, with one pair for each type of clef, in order of the staff position at which each clef places C: `(alto treble tenor soprano baritone mezzosoprano bass)`. If the list contains a single element it applies for all clefs. A single number in place of a pair sets accidentals within the octave ending at that staff position.

`non-default` (boolean)
Set for manually specified clefs and keys.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`padding-pairs` (association list (list of pairs))
: An alist of padding pairs for key signatures (and key cancellations). Each alist entry has the form

```
((left-glyph-name . right-glyph-name) . dist)
```

specifying the padding *dist* between two adjacent key signature elements. If there is no entry in the alist for a given pair, the padding value given by the `padding` property of the `KeySignature` (or `KeyCancellation`) grob is used instead.

A special feature is the handling of adjacent naturals (to be more precise, the handling of glyph `accidentals.natural`): If there is no 'natural-natural' entry in `padding-pairs` explicitly overriding it, LilyPond adds some extra padding (in addition to the grob's `padding` value) to avoid collisions.

`sharp-positions` (list)
: Sharps in key signatures are placed within the specified ranges of staff positions. The general form is a list of pairs, with one pair for each type of clef, in order of the staff position at which each clef places C: `(alto treble tenor soprano baritone mezzosoprano bass)`. If the list contains a single element it applies for all clefs. A single number in place of a pair sets accidentals within the octave ending at that staff position.

Internal properties:

`c0-position` (integer)
: An integer indicating the position of middle C.

This grob interface is used in the following graphical object(s): `KeyCancellation` (page 634), and `KeySignature` (page 637).

3.2.74 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 640).

3.2.75 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 `StaffSymbol` (page 713), 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 643).

3.2.76 ledgered-grob-interface

A grob with possible ledger lines, currently `Script` and `Custos`.

User-settable properties:

`ledger-extra` (dimension, in staff space)
A distance relative to a note head's vertical position to modify the range where ledger lines are drawn, depending on the actually used ledger line positions. If positive, this range gets extended, possibly adding extra ledger lines. If negative, the range gets reduced, possibly removing ledger lines.

`ledger-positions` (list)
A list of vertical positions of ledger lines. Its exact behavior depends on the grob; see `StaffSymbol` (page 713), `NoteHead` (page 670), `Custos` (page 595), and `Script` (page 691).

`length-fraction` (number)
Multiplier for lengths. Used for determining ledger lines and stem lengths.

`no-ledgers` (boolean)
If set, don't draw ledger lines on this object.

This grob interface is used in the following graphical object(s): `Custos` (page 595), and `Script` (page 691).

3.2.77 ledgered-interface

Objects that need ledger lines, typically note heads. See also `ledger-line-spanner-interface` (page 805).

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 541), `ApproximatePitchNoteHead` (page 542), `NoteHead` (page 670), and `TrillPitchHead` (page 744).

3.2.78 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.

3.2.79 `ligature-head-interface`

A note head that can become part of a ligature.

This grob interface is used in the following graphical object(s): `ApproximatePitchNoteHead` (page 542), and `NoteHead` (page 670).

3.2.80 `ligature-interface`

A ligature.

This grob interface is not used in any graphical object.

3.2.81 `line-interface`

Generic line objects. Any object using lines supports this. The property `style` can be `line`, `dashed-line`, `trill`, `dotted-line`, `zigzag` or `none` (a transparent line).

For `dashed-line`, the length of the dashes is tuned with `dash-fraction`. If the latter is set to 0, a dotted line is produced.

User-settable properties:

`arrow-length` (number)
: Arrow length.

`arrow-width` (number)
: Arrow width.

`dash-fraction` (number)
: Size of the dashes, relative to `dash-period`. Should be between `0.1` and `1.0` (continuous line). If set to `0.0`, a dotted line is produced

`dash-period` (number)
: The length of one dash together with whitespace. If negative, no line is drawn at all.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *Staff*`.StaffSymbol.thickness`).

`zigzag-length` (dimension, in staff space)
: The length of the lines of a zigzag, relative to `zigzag-width`. A value of `1` gives 60-degree zigzags.

`zigzag-width` (dimension, in staff space)
: The width of one zigzag squiggle. This number is adjusted slightly so that the spanner line can be constructed from a whole number of squiggles.

This grob interface is used in the following graphical object(s): `ChordSquare` (page 576), `DurationLine` (page 605), `DynamicTextSpanner` (page 611), `Episema` (page 612), `Glissando` (page 622), `Hairpin` (page 626), `HorizontalBracket` (page 627), `LigatureBracket` (page 646), `MeasureSpanner` (page 656), `OttavaBracket` (page 676), `PianoPedalBracket` (page 684), `TextSpanner` (page 735), `TrillSpanner` (page 746), `TupletBracket` (page 747), `VoiceFollower` (page 756), `VoltaBracket` (page 757), and `VowelTransition` (page 760).

3.2.82 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 `horizontal-line-spanner-interface` (page 799).

`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 561), `FingerGlideSpanner` (page 613), `Glissando` (page 622), and `VoiceFollower` (page 756).

3.2.83 `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).

`remove-short-autoextender` (boolean)
: If set, auto-generated unbroken lyric extenders are removed if the lyric syllable stretches up to the last contained note head.

`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:

`auto-generated` (boolean)
: True if the grob was created by an automatic mechanism as opposed to an explicit event. Used for lyric extenders.

`heads` (array of grobs)
: An array of note heads.

This grob interface is used in the following graphical object(s): `LyricExtender` (page 647).

3.2.84 `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 note heads.

`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 648), and `LyricSpace` (page 651).

3.2.85 lyric-interface

Any object that is related to lyrics.

This grob interface is used in the following graphical object(s): `LyricExtender` (page 647), `LyricHyphen` (page 648), `LyricRepeatCount` (page 649), and `VowelTransition` (page 760).

3.2.86 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 649).

3.2.87 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 651).

3.2.88 lyric-syllable-interface

A single piece of lyrics.

This grob interface is used in the following graphical object(s): `LyricText` (page 651).

3.2.89 mark-interface

A rehearsal mark, segno, or coda sign.

This grob interface is used in the following graphical object(s): `CodaMark` (page 583), `RehearsalMark` (page 685), `SegnoMark` (page 695), and `TextMark` (page 731).

3.2.90 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 653).

3.2.91 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 655).

3.2.92 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 656).

3.2.93 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 658).

3.2.94 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): ApproximatePitchNoteHead (page 542), MensuralLigature (page 658), and NoteHead (page 670).

3.2.95 metronome-mark-interface

A metronome mark.

This grob interface is used in the following graphical object(s): MetronomeMark (page 658).

3.2.96 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 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), and MultiMeasureRestText (page 665).

3.2.97 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 note heads.

`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.

`space-increment` (dimension, in staff space)
: The amount by which the total duration of a multi-measure rest affects horizontal spacing. Each doubling of the duration adds `space-increment` to the length of the bar.

`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.

This grob interface is used in the following graphical object(s): `MultiMeasureRest` (page 660), and `PercentRepeat` (page 679).

3.2.98 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 662).

3.2.99 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, . . .

Internal properties:

grace-spacing (graphical (layout) object)
: A run of grace notes.

shortest-playing-duration (positive exact rational or +inf.0)
: The duration of the shortest note playing here.

shortest-starter-duration (positive exact rational or +inf.0)
: The duration of the shortest note that starts here.

This grob interface is used in the following graphical object(s): PaperColumn (page 677).

3.2.100 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 subproperties to use if this column is the start of a system.
  - alignment-distances – A list of vertical distances between the staves of a system.
  - bottom-padding – If set for the lowest staff of the bottommost system on a page, it specifies the distance between the bottom of the page and the lowest staff.
  - extra-offset – A pair of horizontal and vertical offsets for the current staff, relative to either the default layout positions or the positions given with the X-offset and Y-offset subproperties.
  - X-offset – Horizontal (absolute) starting point of the current staff.
  - Y-offset – Vertical (absolute) starting point of the current staff.

`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 564), in a `NonMusicalPaperColumn` (page 667).

This grob interface is used in the following graphical object(s): `NonMusicalPaperColumn` (page 667).

3.2.101 `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 `note-column-interface` (page 818): 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 668).

3.2.102 `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 669).

3.2.103 `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*.

The sense of the `direction` property is the direction of the stem that the head is designed to attach to. For certain glyphs, this might seem counterintuitive. Note that stems do not adapt to forced changes in head direction, so even when a head style has direction-dependent glyphs, proper attachment to the stem depends on the design of the font.

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`.

`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 note head for ambitus calculation.

`ledger-extra` (dimension, in staff space)
: A distance relative to a note head's vertical position to modify the range where ledger lines are drawn, depending on the actually used ledger line positions. If positive, this range gets extended, possibly adding extra ledger lines. If negative, the range gets reduced, possibly removing ledger lines.

`ledger-positions` (list)
: A list of vertical positions of ledger lines. Its exact behavior depends on the grob; see `StaffSymbol` (page 713), `NoteHead` (page 670), `Custos` (page 595), and `Script` (page 691).

`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 note head. Each component is measured in a -1 to 1 scale so that -1 is the left/bottom edge of the note's bounding box and 1 is the right/top edge.

`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 541), `ApproximatePitchNoteHead` (page 542), `NoteHead` (page 670), `TabNoteHead` (page 729), and `TrillPitchHead` (page 744).

3.2.104 note-name-interface

Note names.

This grob interface is used in the following graphical object(s): `NoteName` (page 671).

3.2.105 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 672).

3.2.106 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 718).

3.2.107 optional-material-bracket-interface

An in-staff bracket around optional material.

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`.

`positions` (pair of numbers)
: Pair of staff coordinates (*start* . *end*), where *start* and *end* are vertical positions in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`protrusion` (number)
: In a bracket indicating non-arpeggio or optional material, the length of the horizontal 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`).

This grob interface is used in the following graphical object(s): `OptionalMaterialBracket` (page 673).

3.2.108 `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 note heads.

`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 676).

3.2.109 `outside-staff-axis-group-interface`

A vertical axis group on which outside-staff skyline calculations are done.

User-settable properties:

`outside-staff-placement-directive` (symbol)
: One of four directives telling how outside staff objects should be placed.
  - `left-to-right-greedy` – Place each successive grob from left to right.
  - `left-to-right-polite` – Place a grob from left to right only if it does not potentially overlap with another grob that has been placed on a pass through a grob array. If there is overlap, do another pass to determine placement.
  - `right-to-left-greedy` – Same as `left-to-right-greedy`, but from right to left.
  - `right-to-left-polite` – Same as `left-to-right-polite`, but from right to left.

Internal properties:

`vertical-skyline-elements` (array of grobs)
: An array of grobs used to create vertical skylines.

This grob interface is used in the following graphical object(s): `BassFigureLine` (page 556), `System` (page 724), and `VerticalAxisGroup` (page 754).

3.2.110 `outside-staff-interface`

A grob that could be placed outside staff.

User-settable properties:

`outside-staff-horizontal-padding` (number)
: By default, an outside-staff-object can be placed so that is it very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

`outside-staff-padding` (number)
: The padding to place between grobs when spacing according to `outside-staff-priority`. Two grobs with different `outside-staff-padding` values have the larger value of padding between them.

`outside-staff-priority` (number)
: If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

This grob interface is used in the following graphical object(s): `AccidentalSuggestion` (page 536), `BarNumber` (page 551), `BassFigureAlignmentPositioning` (page 554), `BendSpanner` (page 561), `BreathingSign` (page 565), `CaesuraScript` (page 568), `CenteredBarNumberLineSpanner` (page 570), `ChordName` (page 573), `ClefModifier` (page 580), `CodaMark` (page 583), `CombineTextScript` (page 585), `Divisio` (page 597), `DoublePercentRepeatCounter` (page 603), `DoubleRepeatSlash` (page 604), `DynamicLineSpanner` (page 607), `DynamicText` (page 609), `Fingering` (page 615), `FretBoard` (page 620), `Hairpin` (page 626), `HorizontalBracket` (page 627), `HorizontalBracketText` (page 629), `InstrumentSwitch` (page 631), `JumpScript` (page 633), `LigatureBracket` (page 646), `MeasureCounter` (page 653), `MeasureGrouping` (page 655), `MeasureSpanner` (page 656), `MetronomeMark` (page 658), `MultiMeasureRest` (page 660), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestScript` (page 664), `MultiMeasureRestText` (page 665), `OttavaBracket` (page 676), `PercentRepeatCounter` (page 680), `PhrasingSlur` (page 682), `RehearsalMark` (page 685), `Script` (page 691), `SectionLabel` (page 693), `SegnoMark` (page 695), `Slur` (page 700), `SostenutoPedalLineSpanner` (page 704), `StringNumber` (page 718), `StrokeFinger` (page 720), `SustainPedalLineSpanner` (page 723), `TextMark` (page 731), `TextScript` (page 733), `TextSpanner` (page 735), `TrillSpanner` (page 746), `TupletBracket` (page 747), `TupletNumber` (page 749), `UnaCordaPedalLineSpanner` (page 752), and `VoltaBracketSpanner` (page 758).

3.2.111 `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 802).

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 667), and `PaperColumn` (page 677).

3.2.112 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 678), and `TrillPitchParentheses` (page 745).

3.2.113 passage-delimiter-interface

Items with this interface allow overriding `break-visibility-passage-start`, `break-visibility-passage-default`, and `break-visibility-passage-end` particularly in lieu of overriding `break-visibility`. The precise meaning of 'passage' depends on the type of item.

The internal `passage-direction` property determines which break-visibility property is used in a given instance.

See Section "item-interface" in *Internals Reference*.

User-settable properties:

`break-visibility-passage-default` (vector)
: The value to use for `break-visibility` when the item does not specifically mark the start or end of a passage. (It might be both or neither, depending on the type of item.)

`break-visibility-passage-end` (vector)
: The value to use for `break-visibility` when the item marks the end of a passage.

`break-visibility-passage-start` (vector)
: The value to use for `break-visibility` when the item marks the start of a passage.

Internal properties:

`passage-direction` (direction)
: The placement of a `passage-delimiter-interface` item with respect to its passage: `START` at the start, `END` at the end, or `CENTER` otherwise.

This grob interface is used in the following graphical object(s): `OptionalMaterialBracket` (page 673), and `StaffEllipsis` (page 708).

3.2.114 `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 602), `DoubleRepeatSlash` (page 604), `PercentRepeat` (page 679), and `RepeatSlash` (page 687).

3.2.115 `piano-pedal-bracket-interface`

The bracket of the piano pedal. It can be tuned through the regular bracket properties.

User-settable properties:

`bound-padding` (number)
: The amount of padding to insert around spanner bounds.

`bracket-flare` (pair of numbers)
: A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`dashed-edge` (boolean)
: If set, the bracket edges are dashed like the rest of the bracket.

`edge-height` (pair)
: A pair of numbers specifying the heights of the vertical edges: `(`*`left-height`* `.` *`right-height`*`)`.

`shorten-pair` (pair of numbers)
: The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

Internal properties:

`pedal-text` (graphical (layout) object)
: A pointer to the text grob of a mixed-style piano pedal.

This grob interface is used in the following graphical object(s): `PianoPedalBracket` (page 684).

3.2.116 piano-pedal-interface

A piano pedal sign.

This grob interface is used in the following graphical object(s): `PianoPedalBracket` (page 684), `SostenutoPedalLineSpanner` (page 704), `SustainPedal` (page 722), `SustainPedalLineSpanner` (page 723), and `UnaCordaPedalLineSpanner` (page 752).

3.2.117 piano-pedal-script-interface

A piano pedal sign, fixed size.

This grob interface is used in the following graphical object(s): `SostenutoPedal` (page 702), `SustainPedal` (page 722), and `UnaCordaPedal` (page 750).

3.2.118 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 744), and `TrillPitchParentheses` (page 745).

3.2.119 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 547), Clef (page 577), CueClef (page 589), CueEndClef (page 592), KeyCancellation (page 634), KeySignature (page 637), SignumRepetitionis (page 697), SpanBarStub (page 707), and TimeSignature (page 739).

3.2.120 rehearsal-mark-interface

A rehearsal mark.

This grob interface is used in the following graphical object(s): RehearsalMark (page 685).

3.2.121 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 690).

3.2.122 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 660), and Rest (page 689).

3.2.123 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): ApproximatePitchNoteHead (page 542), BassFigure (page 553), ChordName

(page 573), ClusterSpannerBeacon (page 582), DoubleRepeatSlash (page 604), FretBoard (page 620), LyricText (page 651), NoteHead (page 670), RepeatSlash (page 687), Rest (page 689), and TabNoteHead (page 729).

3.2.124 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): ApproximatePitchNoteHead (page 542), NoteHead (page 670), Rest (page 689), and TabNoteHead (page 729).

3.2.125 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 692), and ScriptRow (page 693).

3.2.126 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.

`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.

`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.

`toe-heel-style` (symbol)
: The style used for toe and heel glyphs of a `Script` grob.

This grob interface is used in the following graphical object(s): `AccidentalSuggestion` (page 536), `CaesuraScript` (page 568), `DynamicText` (page 609), `MultiMeasureRestScript` (page 664), and `Script` (page 691).

3.2.127 section-label-interface

A section label, e.g., “Coda”.

This grob interface is used in the following graphical object(s): `SectionLabel` (page 693).

3.2.128 segno-mark-interface

A segno.

This grob interface is used in the following graphical object(s): `SegnoMark` (page 695).

3.2.129 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
ly: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
ly: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 note heads when aligning itself on NoteColumn.

This grob interface is used in the following graphical object(s): AccidentalSuggestion (page 536), BarNumber (page 551), CaesuraScript (page 568), ClefModifier (page 580), CodaMark (page 583), CombineTextScript (page 585), DoublePercentRepeatCounter (page 603), DynamicText (page 609), Fingering (page 615), GridLine (page 624), Hairpin (page 626), HorizontalBracketText (page 629), InstrumentName (page 630), InstrumentSwitch (page 631), JumpScript (page 633), LyricRepeatCount (page 649), LyricText (page 651), MeasureCounter (page 653), MeasureSpanner (page 656), MetronomeMark (page 658), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), MultiMeasureRestText (page 665), NoteName (page 671), PercentRepeatCounter (page 680), RehearsalMark (page 685), Script (page 691), SectionLabel (page 693), SegnoMark (page 695), SostenutoPedal (page 702), StemTremolo (page 717), StringNumber (page 718), StrokeFinger (page 720), SustainPedal (page 722), TextMark (page 731), TextScript (page 733), and UnaCordaPedal (page 750).

3.2.130 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 642), and `RepeatTieColumn` (page 689).

3.2.131 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 533, 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 761, 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`).

`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 641), and `RepeatTie` (page 688).

3.2.132 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 667), `NoteColumn` (page 669), and `PaperColumn` (page 677).

3.2.133 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 536), Arpeggio (page 544), BarNumber (page 551), BassFigureAlignmentPositioning (page 554), CaesuraScript (page 568), CenteredBarNumberLineSpanner (page 570), ChordBracket (page 572), ChordSlur (page 574), ClefModifier (page 580), CodaMark (page 583), CombineTextScript (page 585), DoublePercentRepeatCounter (page 603),

DynamicLineSpanner (page 607), Episema (page 612), Fingering (page 615), HorizontalBracket (page 627), HorizontalBracketText (page 629), InstrumentName (page 630), InstrumentSwitch (page 631), JumpScript (page 633), MeasureCounter (page 653), MeasureGrouping (page 655), MeasureSpanner (page 656), MetronomeMark (page 658), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), MultiMeasureRestText (page 665), OttavaBracket (page 676), PercentRepeatCounter (page 680), RehearsalMark (page 685), Script (page 691), SectionLabel (page 693), SegnoMark (page 695), SostenutoPedalLineSpanner (page 704), StanzaNumber (page 714), StringNumber (page 718), StrokeFinger (page 720), SustainPedalLineSpanner (page 723), SystemStartBar (page 725), SystemStartBrace (page 726), SystemStartBracket (page 727), SystemStartSquare (page 728), TextMark (page 731), TextScript (page 733), TextSpanner (page 735), TrillPitchAccidental (page 742), TrillPitchGroup (page 743), TrillSpanner (page 746), UnaCordaPedalLineSpanner (page 752), VoltaBracket (page 757), and VoltaBracketSpanner (page 758).

3.2.134 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 697).

3.2.135 `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.

`edge-attraction-factor`
: Factor used to calculate the demerit for distances between slur endpoints and their corresponding base attachments.

`edge-slope-exponent`
: Factor used to calculate the demerit for the slope of a slur near its endpoints; a larger value yields a larger demerit.

`encompass-object-range-overshoot`
: Widen the range of `encompass-object` positions by this amount for computing the slur.

`extra-encompass-collision-distance`
: This detail is currently unused.

`extra-encompass-free-distance`
: The amount of vertical free space that must exist between a slur and various objects it encompasses, including accidentals, fingerings, and tuplet numbers.

`extra-object-collision-penalty`
: Factor to calculate demerit for extra objects that the slur encompasses, including accidentals, fingerings, and tuplet 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`.

`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 533, 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 761, 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`.

`eccentricity` (number)
: How asymmetrical to make a slur. Positive means move the center to the right.

`height-limit` (dimension, in staff space)
: Maximum slur height: The longer the slur, the closer it is to this height.

`inspect-quants` (pair of numbers)
: If debugging is set, set beam and slur position to a (quantized) position that is as close as possible to this value, and print the demerits for the inspected position in the output.

`line-thickness` (number)
: For slurs and ties, this is the diameter of the virtual "pen" that draws the two arcs of the curve's outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

`positions` (pair of numbers)
: Pair of staff coordinates (*`start`* `.` *`end`*), where *start* and *end* are vertical positions in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`ratio` (number)
: Parameter for slur shape. The higher this number, the quicker the slur attains its `height-limit`.

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`annotation` (string)
: Annotate a grob for debug purposes.

`encompass-objects` (array of grobs)
: Objects that a slur should avoid in addition to notes and stems.

`note-columns` (array of grobs)
: An array of `NoteColumn` grobs.

This grob interface is used in the following graphical object(s): `PhrasingSlur` (page 682), and `Slur` (page 700).

3.2.136 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 667), and `PaperColumn` (page 677).

3.2.137 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 672), and `StaffSpacing` (page 712).

3.2.138 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 623), and `SpacingSpanner` (page 705).

3.2.139 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 705).

3.2.140 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 706).

3.2.141 span-bar-stub-interface

A stand-in for a bar line that is used when engraving span bars. This is an internal interface even though some of its properties are documented as user properties.

User-settable properties:

`allow-span-bar` (boolean)
: If false, no inter-staff bar line will be created below this bar line.

Internal properties:

`allow-span-bar-above` (boolean)
: If false, no inter-staff bar line will be created above this item.

`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): `SpanBarStub` (page 707).

3.2.142 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 note heads.

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 note head.

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 553), BassFigureAlignmentPositioning (page 554), BassFigureContinuation (page 556), BassFigureLine (page 556), Beam (page 557), BendAfter (page 560), BendSpanner (page 561), CenteredBarNumber (page 569), CenteredBarNumberLineSpanner (page 570), ChordSquare (page 576), ClusterSpanner (page 582), DurationLine (page 605), DynamicLineSpanner (page 607), DynamicTextSpanner (page 611), Episema (page 612), FingerGlideSpanner (page 613), Glissando (page 622), GraceSpacing (page 623), GridChordName (page 623), Hairpin (page 626), HorizontalBracket (page 627), HorizontalBracketText (page 629), InstrumentName (page 630), KievanLigature (page 640), LedgerLineSpanner (page 643), LigatureBracket (page 646), LyricExtender (page 647), LyricHyphen (page 648), LyricSpace (page 651), MeasureCounter (page 653), MeasureGrouping (page 655), MeasureSpanner (page 656), MensuralLigature (page 658), MultiMeasureRest (page 660), MultiMeasureRestNumber (page 662), MultiMeasureRestScript (page 664), MultiMeasureRestText (page 665), OttavaBracket (page 676), PercentRepeat (page 679), PercentRepeatCounter (page 680), PhrasingSlur (page 682), PianoPedalBracket (page 684), Slur (page 700), SostenutoPedalLineSpanner (page 704), SpacingSpanner (page 705), StaffGrouper (page 710), StaffHighlight (page 711), StaffSymbol (page 713), SustainPedalLineSpanner (page 723), System (page 724), SystemStartBar (page 725), SystemStartBrace (page 726), SystemStartBracket (page 727), SystemStartSquare (page 728), TextSpanner (page 735), Tie (page 737), TieColumn (page 739), TrillSpanner (page 746), TupletBracket (page 747), TupletNumber (page 749), UnaCordaPedalLineSpanner (page 752), VaticanaLigature (page 753), VerticalAlignment (page 753), VerticalAxisGroup (page 754), VoiceFollower (page 756),

VoltaBracket (page 757), VoltaBracketSpanner (page 758), and VowelTransition (page 760).

In addition, this interface is supported conditionally by the following objects depending on their class: BalloonText (page 545), ControlPoint (page 587), ControlPolygon (page 588), Footnote (page 618), and Parentheses (page 678).

3.2.143 staff-ellipsis-interface

A visual marker (usually three consecutive dots) to indicate that typesetting of music is skipped.

This grob interface is used in the following graphical object(s): StaffEllipsis (page 708).

3.2.144 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 710).

3.2.145 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 711).

3.2.146 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 712).

3.2.147 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 "Grobs and their break-align symbols" in *Notation Reference*.

`ledger-extra` (dimension, in staff space)
: A distance relative to a note head's vertical position to modify the range where ledger lines are drawn, depending on the actually used ledger line positions. If positive, this range gets extended, possibly adding extra ledger lines. If negative, the range gets reduced, possibly removing ledger lines.

`ledger-line-thickness` (pair of numbers)
: The thickness of ledger lines. It is the sum of two numbers: The first is the factor for line thickness, and the second for staff space. Both contributions are added.

`ledger-positions` (list)
: A list of vertical positions of ledger lines. Its exact behavior depends on the grob; see `StaffSymbol` (page 713), `NoteHead` (page 670), `Custos` (page 595), and `Script` (page 691).

`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 713).

3.2.148 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 541), `ApproximatePitchNoteHead` (page 542), `Arpeggio` (page 544), `Beam` (page 557), `ChordBracket` (page 572), `ChordSlur` (page 574), `Clef` (page 577), `CueClef` (page 589), `CueEndClef` (page 592), `Custos` (page 595), `Dots` (page 600), `KeyCancellation` (page 634), `KeySignature` (page 637), `MultiMeasureRest` (page 660), `NoteHead` (page 670), `Rest` (page 689), `TabNoteHead` (page 729), and `TrillPitchHead` (page 744).

3.2.149 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 714).

3.2.150 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 533, 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 761, 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.

`french-beaming` (boolean)
: Use French beaming style for this stem. The stem stops at the innermost beams.

`length` (dimension, in staff space)
: User override for the stem length of unbeamed stems (each unit represents half a `staff-space`).

`length-fraction` (number)
: Multiplier for lengths. Used for determining ledger lines and stem lengths.

`max-beam-connect` (integer)
: Maximum number of beams to connect to beams from this stem. Further beams are typeset as beamlets.

`neutral-direction` (direction)
: Which direction to take in the center of the staff.

`no-stem-extend` (boolean)
: If set, notes with ledger lines do not get stems extending to the middle staff line.

`note-collision-threshold` (dimension, in staff space)
: Simultaneous notes that are this close or closer in units of `staff-space` will be identified as vertically colliding. Used by `Stem` grobs for notes in the same voice, and `NoteCollision` grobs for notes in different voices. Default value 1.

`stem-begin-position` (number)
: User override for the begin position of a stem.

`stemlet-length` (number)
: How long should be a stem over a rest?

`thickness` (number)
: For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to *`Staff`*`.StaffSymbol.thickness`).

Internal properties:

`beam` (graphical (layout) object)
: A pointer to the beam, if applicable.

`flag` (graphical (layout) object)
: A pointer to a `Flag` object.

`french-beaming-stem-adjustment` (dimension, in staff space)
: Stem will be shortened by this amount of space in case of French beaming style.

`melody-spanner` (graphical (layout) object)
: The `MelodyItem` object for a stem.

`note-heads` (array of grobs)
: An array of note head grobs.

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

`rests` (array of grobs)
: An array of rest objects.

`stem-info` (pair)
A cache of stem parameters.

`tremolo-flag` (graphical (layout) object)
The tremolo object on a stem.

This grob interface is used in the following graphical object(s): `Stem` (page 715).

3.2.151 `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 717).

3.2.152 `sticky-grob-interface`

A grob that is attached to another grob. Grobs type having this interface can be either items or spanners, depending on the class of their host. Sticky spanners implicitly take their bounds from the host.

Internal properties:

`sticky-host` (graphical (layout) object)
The grob that a sticky grob attaches to.

This grob interface is used in the following graphical object(s): `BalloonText` (page 545), `ControlPoint` (page 587), `ControlPolygon` (page 588), `Footnote` (page 618), and `Parentheses` (page 678).

3.2.153 string-number-interface

A string number instruction.

This grob interface is used in the following graphical object(s): `StringNumber` (page 718).

3.2.154 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 720).

3.2.155 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 840).

User-settable properties:

`labels` (list)
: List of labels (symbols) placed on a column.

`page-number` (number)
: Page number on which this system ends up.

`rank-on-page` (number)
: 0-based index of the system on a page.

Internal properties:

`all-elements` (array of grobs)
: An array of all grobs in this line. Its function is to protect objects from being garbage collected.

`columns` (array of grobs)
: An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

`footnote-stencil` (stencil)
: The stencil of a system's footnotes.

`footnotes-after-line-breaking` (array of grobs)
: Footnote grobs of a broken system.

`footnotes-before-line-breaking` (array of grobs)
: Footnote grobs of a whole system.

`in-note-direction` (direction)
: Direction to place in-notes above a system.

`in-note-stencil` (stencil)
: The stencil of a system's in-notes.

`in-note-system-padding` (number)
: Padding between in-note and its associated system.

`pure-Y-extent` (pair of numbers)
: The estimated height of a system.

`vertical-alignment` (graphical (layout) object)
: The `VerticalAlignment` in a `System`.

This grob interface is used in the following graphical object(s): `System` (page 724).

3.2.156 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 725), `SystemStartBrace` (page 726), `SystemStartBracket` (page 727), and `SystemStartSquare` (page 728).

3.2.157 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 630).

3.2.158 `tab-note-head-interface`

A note head in tablature.

The following properties may be set in the `details` list.

`cautionary-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.

`harmonic-properties`
: 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.

`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.

`tied-properties`
An alist with the following elements.

`tied`
Keep track whether a `Tie` ends at this note.

`repeat-tied`
Does this note hold a `RepeatTie`? `'repeat-tied` is also set if the note is part of a chord with set `RepeatTie`.

`note-head-visible`
If set to `#t`, show a number for a note with `\repeatTie` or a note ending a `Tie`.

`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 533, 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 761, for documentation of the available parameters. Supporting interfaces can be found at the bottom of a grob's description section.

`parenthesized` (boolean)
Parenthesize this grob.

Internal properties:

`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 729).

3.2.159 `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 flags to be displayed within markups (via `\note-by-number`). 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 545), `BarNumber` (page 551), `BassFigure` (page 553), `BendSpanner` (page 561), `BreathingSign` (page 565), `CenteredBarNumber` (page 569), `ChordName` (page 573), `ClefModifier` (page 580), `CodaMark` (page 583), `CombineTextScript` (page 585), `ControlPoint` (page 587), `ControlPolygon` (page 588), `Divisio` (page 597), `DoublePercentRepeatCounter` (page 603), `DynamicText` (page 609), `DynamicTextSpanner` (page 611), `Fingering` (page 615), `Footnote` (page 618), `GridChordName` (page 623), `HorizontalBracketText` (page 629), `InstrumentName` (page 630), `InstrumentSwitch` (page 631), `JumpScript` (page 633), `LyricRepeatCount` (page 649), `LyricText` (page 651), `MeasureCounter` (page 653), `MeasureSpanner` (page 656), `MetronomeMark` (page 658), `MultiMeasureRestNumber` (page 662), `MultiMeasureRestText` (page 665), `NoteName` (page 671), `OttavaBracket` (page 676), `PercentRepeatCounter` (page 680), `RehearsalMark` (page 685), `SectionLabel` (page 693), `SegnoMark` (page 695), `SostenutoPedal` (page 702), `StaffEllipsis` (page 708), `StanzaNumber` (page 714), `StringNumber` (page 718), `StrokeFinger` (page 720), `SustainPedal` (page 722), `TabNoteHead` (page 729), `TextMark` (page 731), `TextScript` (page 733), `TupletNumber` (page 749), `UnaCordaPedal` (page 750), and `VoltaBracket` (page 757).

3.2.160 `text-mark-interface`

A textual mark.

This grob interface is used in the following graphical object(s): `TextMark` (page 731).

3.2.161 `text-script-interface`

An object that is put above or below a note.

User-settable properties:

`avoid-slur` (symbol)
: Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

`script-priority` (number)
: A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

Internal properties:

`slur` (graphical (layout) object)
: A pointer to a `Slur` object.

This grob interface is used in the following graphical object(s): `BendSpanner` (page 561), `CombineTextScript` (page 585), `Fingering` (page 615), `StringNumber` (page 718), `StrokeFinger` (page 720), and `TextScript` (page 733).

3.2.162 `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 739).

3.2.163 `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 533, 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 761, 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 641), RepeatTie (page 688), and Tie (page 737).

3.2.164 time-signature-interface

A time signature, in different styles. The following values of 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-mensural 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 mensuration 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.

When style allows printing denominators, denominator-style can alter them. The following values are recognized:

none
: Do not print denominators.

note
: Print denominators as a note and dots when exact representation is possible; otherwise print them as numbers.

number
: Print denominators as numbers. This is the default.

When the denominator is a note, note-flag-style and note-head-style control its appearance, and note-dots-direction and note-staff-position control its placement.

The fraction property has been superseded by time-signature. By default, getting fraction returns the value of time-signature reduced to a fraction. Setting fraction has no effect.

User-settable properties:

denominator-style (symbol)
: The style of denominators in a time signature.

fraction (pair of numbers)
: A fraction.

`nested-fraction-mixed` (boolean)
: Whether a fractional term of a time signature is printed as a mixed number (e.g., '2 1/2') or as a common fraction (e.g., '5/2').

`nested-fraction-orientation` (symbol)
: A symbol describing the orientation of a fractional part of a time signature.

`nested-fraction-relative-font-size` (number)
: The font size of a numeral in a fractional term of a time signature, relative to size of the whole numbers.

`note-dots-direction` (direction)
: Whether the augmentation dots are shifted up or down (or not shifted) relative to the note head in a number-over-note time signature.

`note-flag-style` (symbol)
: The style of the flags in a number-over-note time signature. See `flag-style`.

`note-head-style` (symbol)
: The style of the note head in a number-over-note time signature. See Section "Note head styles" in *Notation Reference*.

`note-staff-position` (number)
: The position of the note in a number-over-note time signature. See `staff-position`.

`senza-misura-stencil` (stencil)
: The symbol to print when `TimeSignature.time-signature` 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.

`time-signature` (time signature)
: A time-signature specification. See the `\time` command.

This grob interface is used in the following graphical object(s): `TimeSignature` (page 739).

3.2.165 trill-pitch-accidental-interface

An accidental for trill pitch.

This grob interface is used in the following graphical object(s): `TrillPitchAccidental` (page 742).

3.2.166 trill-spanner-interface

A trill spanner.

This grob interface is used in the following graphical object(s): `TrillSpanner` (page 746).

3.2.167 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 646), and `TupletBracket` (page 747).

3.2.168 `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 749).

3.2.169 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 557), `DurationLine` (page 605), and `Glissando` (page 622).

3.2.170 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).

`head-x-offset` (dimension, in staff space)
: Extra horizontal offset for ligature heads.

This grob interface is used in the following graphical object(s): `ApproximatePitchNoteHead` (page 542), `NoteHead` (page 670), and `VaticanaLigature` (page 753).

3.2.171 `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`).

`volta-number-offset` (pair of numbers)
: The offset of the volta number relative to the upper left corner of the volta bracket.

Internal properties:

`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.

`volta-numbers` (number list)
: List of volta numbers.

This grob interface is used in the following graphical object(s): `VoltaBracket` (page 757).

3.2.172 `volta-interface`

A volta repeat.

This grob interface is used in the following graphical object(s): `VoltaBracket` (page 757), and `VoltaBracketSpanner` (page 758).

3.3 User backend properties

`accidental-padding` (number)
: Property used by Beam to avoid accidentals in whole-note tremolos.

`add-stem-support` (boolean)
: If set, the `Stem` object is included in this script's support.

`after-line-breaking` (boolean)
: Dummy property, used to trigger callback for `after-line-breaking`.

`align-dir` (direction)
: Which side to align? `-1`: left side, `0`: around center of width, `1`: right side.

`allow-loose-spacing` (boolean)
: If set, column can be detached from main spacing.

`allow-span-bar` (boolean)
: If false, no inter-staff bar line will be created below this bar line.

`alteration` (number)
: Alteration numbers for accidental.

`alteration-alist` (association list (list of pairs))
: List of (*`pitch`* . *`accidental`*) pairs for key signature.

`alteration-glyph-name-alist` (association list (list of pairs))
: An alist of key-string pairs.

`annotation-balloon` (boolean)
: Print the balloon around an annotation.

`annotation-line` (boolean)
: Print the line from an annotation to the grob that it annotates.

`arpeggio-direction` (direction)
: If set, put an arrow on the arpeggio squiggly line.

`arrow-length` (number)
: Arrow length.

`arrow-width` (number)
: Arrow width.

`auto-knee-gap` (dimension, in staff space)
: If a gap is found between note heads where a horizontal beam fits and it is larger than this number, make a kneed beam.

`automatically-numbered` (boolean)
: If set, footnotes are automatically numbered.

`average-spacing-wishes` (boolean)
: If set, the spacing wishes are averaged over staves.

`avoid-note-head` (boolean)
: If set, the stem of a chord does not pass through all note heads, but starts at the last note head.

`avoid-scripts` (boolean)
: If set, a tuplet bracket avoids the scripts associated with the note heads it encompasses.

`avoid-slur` (symbol)
: Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

`axes` (list)
: List of axis numbers. In the case of alignment grobs, this should contain only one number.

`bar-extent` (pair of numbers)
: The Y-extent of the actual bar line. This may differ from `Y-extent` because it does not include the dots in a repeat bar line.

`base-shortest-duration` (moment)
: Spacing is based on the shortest notes in a piece. Normally, pieces are spaced as if notes at least as short as this are present.

`baseline-skip` (dimension, in staff space)
: Distance between base lines of multiple lines of text.

`beam-thickness` (dimension, in staff space)
: Beam thickness, measured in `staff-space` units.

`beam-width` (dimension, in staff space)
: Width of the tremolo sign.

`beamed-stem-shorten` (list)
: How much to shorten beamed stems, when their direction is forced. It is a list, since the value is different depending on the number of flags and beams.

`beaming` (pair)
: Pair of number lists. Each number list specifies which beams to make. `0` is the central beam, `1` is the next beam toward the note, etc. This information is used to determine how to connect the beaming patterns from stem to stem inside a beam.

`beamlet-default-length` (pair)
: A pair of numbers. The first number specifies the default length of a beamlet that sticks out of the left hand side of this stem; the second number specifies the default length of the beamlet to the right. The actual length of a beamlet is determined by taking either the default length or the length specified by `beamlet-max-length-proportion`, whichever is smaller.

`beamlet-max-length-proportion` (pair)
: The maximum length of a beamlet, as a proportion of the distance between two adjacent stems.

`before-line-breaking` (boolean)
: Dummy property, used to trigger a callback function.

`bend-me` (boolean)
: Decide whether this grob is bent.

`between-cols` (pair)
: Where to attach a loose column to.

`bound-details` (alist, with symbols as keys)
: An alist of properties for determining attachments of spanners to edges.

`bound-padding` (number)
: The amount of padding to insert around spanner bounds.

`bound-prefatory-paddings` (pair of numbers)
: For a highlight, the amount of padding to insert at a bound from a prefatory item that is not a bar line.

`bracket-flare` (pair of numbers)
: A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`bracket-visibility` (boolean or symbol)
: This controls the visibility of the tuplet bracket. Setting it to `#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 "Grobs and their break-align symbols" in *Notation Reference* and 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))
```

The same result can be achieved more conveniently by:

```
\breakAlignInsert time-signature before clef
```

`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 "Grobs and their break-align symbols" in *Notation Reference*.

`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.

`break-visibility` (vector)
: A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`break-visibility-passage-default` (vector)
: The value to use for `break-visibility` when the item does not specifically mark the start or end of a passage. (It might be both or neither, depending on the type of item.)

`break-visibility-passage-end` (vector)
: The value to use for `break-visibility` when the item marks the end of a passage.

`break-visibility-passage-start` (vector)
: The value to use for `break-visibility` when the item marks the start of a passage.

`breakable` (boolean)
: Allow breaks here.

`broken-bound-padding` (number)
: The amount of padding to insert when a spanner is broken at a line break.

`chord-dots-limit` (integer)
: Limits the column of dots on each chord to the height of the chord plus `chord-dots-limit` staff positions.

`circled-tip` (boolean)
: Put a circle at start/end of hairpins (al/del niente).

`clef-alignments` (alist, with symbols as keys)
: An alist of parent-alignments that should be used for clef modifiers with various clefs

`clip-edges` (boolean)
: Allow outward pointing beamlets at the edges of beams?

`collapse-height` (dimension, in staff space)
: Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

`collision-interfaces` (list)
: A list of interfaces for which automatic beam-collision resolution is run.

`collision-voice-only` (boolean)
Avoid beam collisions only with grobs of 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`).

`denominator-style` (symbol)
The style of denominators in a time signature.

`details` (alist, with symbols as keys)
An alist of parameters for detailed grob behavior. See Section 3.1 [All layout objects], page 533, 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 761, 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 flags to be displayed within markups (via `\note-by-number`). 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` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`font-family` (symbol)
: The font family is the broadest category for selecting text fonts. Options include `serif`, `sans` 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` (or `extralight`), `light`, `semilight` (or `demilight`), `book`, `normal` (or `regular`), `medium`, `semibold` (or `demibold`), `bold`, `ultrabold` (or `extrabold`), `heavy` (or `black`), and `ultraheavy` (or `ultrablack` or `extrablack`).

`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`.

`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` (pair of numbers)
: A fraction.

`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`.
    - `barre-thickness` – Thickness of barre line, in multiples of `dot-radius`. Only defined for `barre-type=straight`. Default value 1.
  - `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-overhang` – Extension of string lines beyond last fret line, in multiples of `fret-distance`. Default value 1.
- `string-thickness-factor` – Factor for changing thickness of each string in the fret diagram. Thickness of string *k* is given by `thickness` * (1+`string-thickness-factor`) ^ (*k*-1). Default 0.
- `top-fret-thickness` – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.
- `xo-font-magnification` – Magnification used for mute and open string indicators. Default value 0.5.
- `xo-padding` – Padding for open and mute indicators from top fret. Default value 0.25.

`full-length-padding` (number)
: How much padding to use at the right side of a full-length tuplet bracket.

`full-length-to-extent` (boolean)
: Run to the extent of the column for a full-length tuplet bracket.

`full-measure-extra-space` (number)
Extra space that is allocated at the beginning of a measure with only one note. This property is read from the NonMusicalPaperColumn that begins the measure.

`full-size-change` (boolean)
Don't make a change clef smaller.

`gap` (dimension, in staff space)
Size of a gap in a variable symbol.

`gap-count` (integer)
Number of 'floating' beams in a two-stem 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 note head 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)
A distance relative to a note head's vertical position to modify the range where ledger lines are drawn, depending on the actually used ledger line positions. If positive, this range gets extended, possibly adding extra ledger lines. If negative, the range gets reduced, possibly removing ledger lines.

`ledger-line-thickness` (pair of numbers)
The thickness of ledger lines. It is the sum of two numbers: The first is the factor for line thickness, and the second for staff space. Both contributions are added.

`ledger-positions` (list)
A list of vertical positions of ledger lines. Its exact behavior depends on the grob; see `StaffSymbol` (page 713), `NoteHead` (page 670), `Custos` (page 595), and `Script` (page 691).

`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 subproperties to use if this column is the start of a system.

- `alignment-distances` – A list of vertical distances between the staves of a system.

- `bottom-padding` – If set for the lowest staff of the bottommost system on a page, it specifies the distance between the bottom of the page and the lowest staff.
- `extra-offset` – A pair of horizontal and vertical offsets for the current staff, relative to either the default layout positions or the positions given with the `X-offset` and `Y-offset` subproperties.
- `X-offset` – Horizontal (absolute) starting point of the current staff.
- `Y-offset` – Vertical (absolute) starting point of the current staff.

`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 coordinates (number pairs) applied to the chord names of a chord square. Coordinates are normalized between -1 and 1 within the square.

`measure-division-lines-alist` (association list (list of pairs))
An alist mapping measure divisions (see the `measure-division` property) to lists of lines to draw in the square, given as 4-element lists: `(`*`x-start y-start x-end y-end`*`)`.

`measure-length` (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 note heads.

`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 note head.

`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.

`nested-fraction-mixed` (boolean)
Whether a fractional term of a time signature is printed as a mixed number (e.g., '2 1/2') or as a common fraction (e.g., '5/2').

`nested-fraction-orientation` (symbol)
A symbol describing the orientation of a fractional part of a time signature.

`nested-fraction-relative-font-size` (number)
The font size of a numeral in a fractional term of a time signature, relative to size of the whole numbers.

`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-dots-direction` (direction)
Whether the augmentation dots are shifted up or down (or not shifted) relative to the note head in a number-over-note time signature.

`note-flag-style` (symbol)
The style of the flags in a number-over-note time signature. See `flag-style`.

`note-head-style` (symbol)
The style of the note head in a number-over-note time signature. See Section "Note head styles" in *Notation Reference*.

`note-names` (vector)
: Vector of strings containing names for easy-notation note heads.

`note-staff-position` (number)
: The position of the note in a number-over-note time signature. See `staff-position`.

`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

```
((left-glyph-name . right-glyph-name) . dist)
```

specifying the padding *dist* between two adjacent key signature elements. If there is no entry in the alist for a given pair, the padding value given by the `padding` property of the `KeySignature` (or `KeyCancellation`) grob is used instead.

A special feature is the handling of adjacent naturals (to be more precise, the handling of glyph `accidentals.natural`): If there is no 'natural-natural' entry in `padding-pairs` explicitly overriding it, LilyPond adds some extra padding (in addition to the grob's `padding` value) to avoid collisions.

`page-break-penalty` (number)
Penalty for page break at this column. This affects the choices of the page breaker; it avoids a page break at a column with a positive penalty and prefers a page break at a column with a negative penalty.

`page-break-permission` (symbol)
Instructs the page breaker on whether to put a page break at this column. Can be `force` or `allow`.

`page-number` (number)
Page number on which this system ends up.

`page-turn-penalty` (number)
Penalty for a page turn at this column. This affects the choices of the page breaker; it avoids a page turn at a column with a positive penalty and prefers a page turn at a column with a negative penalty.

`page-turn-permission` (symbol)
Instructs the page breaker on whether to put a page turn at this column. Can be `force` or `allow`.

`parent-alignment-X` (number)
Specify on which point of the parent the object is aligned. The value `-1` means aligned on parent's left edge, `0` on center, and `1` right edge, in X direction. Other numerical values may also be specified - the unit is half the parent's width. If 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 (*start* . *end*), where *start* and *end* are vertical positions in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`prefer-dotted-right` (boolean)
For note collisions, prefer to shift dotted up-note to the right, rather than shifting just the dot.

`protrusion` (number)
In a bracket indicating non-arpeggio or optional material, 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.

`remove-short-autoextender` (boolean)
If set, auto-generated unbroken lyric extenders are removed if the lyric syllable stretches up to the last contained note head.

`replacement-alist` (association list (list of pairs))
Alist of strings. The key is a string of the pattern to be replaced. The value is a string of what should be displayed. Useful for ligatures.

`restore-first` (boolean)
Print a natural before the accidental.

`rhythmic-location` (rhythmic location)
Where (bar number, measure position) in the score.

`right-bound-info` (alist, with symbols as keys)
An alist of properties for determining attachments of spanners to edges.

`right-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.time-signature` 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*.

`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 "Grobs and their break-align symbols" in *Notation 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-increment` (dimension, in staff space)
: The amount by which the total duration of a multi-measure rest affects horizontal spacing. Each doubling of the duration adds `space-increment` to the length of the bar.

`space-to-barline` (boolean)
: If set, the distance between a note and the following non-musical column will be measured to the bar line instead of to the beginning of the non-musical column. If there is a clef change followed by a bar line, for example, this means that we will try to space the non-musical column as though the clef is not there.

`spacing-increment` (dimension, in staff space)
The unit of length for note-spacing. Typically, the width of a note head. See also Section "spacing-spanner-interface" in *Internals Reference*.

`spacing-pair` (pair)
A pair of alignment symbols which set an object's spacing relative to its left and right `BreakAlignments`.

For example, a `MultiMeasureRest` will ignore prefatory items at its bounds (i.e., clefs, key signatures and time signatures) using the following override:

```
\override MultiMeasureRest.spacing-pair =
              #'(staff-bar . staff-bar)
```

`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 note head. Each component is measured in a -1 to 1 scale so that -1 is the left/bottom edge of the note's bounding box and 1 is the right/top edge.

`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.

`time-signature` (time signature)
: A time-signature specification. See the `\time` command.

`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-log`s 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 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. If `whiteout-color` is set, use this color instead of white for the background.

`whiteout-color` (color)
The background color used if property `whiteout` is set.

`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 note heads 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 829).

`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.

`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 829).

`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.

`allow-span-bar-above` (boolean)
: If false, no inter-staff bar line will be created above this item.

`annotation` (string)
: Annotate a grob for debug purposes.

`ascendens` (boolean)
: Is this neume of ascending type?

`auctum` (boolean)
: Is this neume liquescentically augmented?

`auto-generated` (boolean)
: True if the grob was created by an automatic mechanism as opposed to an explicit event. Used for lyric extenders.

`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)
: A pointer to the text grob of an analysis bracket.

`break-alignment` (graphical (layout) object)
: The `BreakAlignment` (page 564), in a `NonMusicalPaperColumn` (page 667).

`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 neighbor head. `context-info` holds for each head such information about the left and right neighbor, encoded as a bit mask.

`covered-grobs` (array of grobs)
Grobs that could potentially collide with a beam.

`cross-staff` (boolean)
True for grobs whose `Y-extent` depends on inter-staff spacing. The extent is measured relative to the grobs's parent staff (more generally, its `VerticalAxisGroup`) so this boolean flags grobs that are not rigidly fixed to their parent staff. Beams that join notes from two staves are `cross-staff`. Grobs that are positioned around such beams are also `cross-staff`. Grobs that are grouping objects, however, like `VerticalAxisGroups` will not in general be marked `cross-staff` when some of the members of the group are `cross-staff`.

`delta-position` (number)
The vertical position difference.

`deminutum` (boolean)
Is this neume diminished?

`descendens` (boolean)
Is this neume of descendant type?

`direction-source` (graphical (layout) object)
In case `side-relative-direction` is set, which grob to get the direction from.

`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.

`head-x-offset` (dimension, in staff space)
: Extra horizontal offset for ligature heads.

`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?

`passage-direction` (direction)
: The placement of a `passage-delimiter-interface` item with respect to its passage: `START` at the start, `END` at the end, or `CENTER` otherwise.

`pedal-text` (graphical (layout) object)
: A pointer to the text grob 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.

`shortest-playing-duration` (positive exact rational or +inf.0)
The duration of the shortest note playing here.

`shortest-starter-duration` (positive exact rational or +inf.0)
The duration of the shortest note that starts here.

`side-support-elements` (array of grobs)
The side support, an array of grobs.

`slur` (graphical (layout) object)
A pointer to a `Slur` object.

`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.

`toe-heel-style` (symbol)
: The style used for toe and heel glyphs of a `Script` grob.

`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.

`vertically-spanning-surrogate` (graphical (layout) object)
: When an engraver hides a shorter instance of a vertically spanning grob (e.g., an arpeggio sign) to allow a taller instance to appear, this property may be set in the shorter instance to allow navigation to the taller instance.

`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.

`Y-common` (graphical (layout) object)
: See `X-common`.

4 Scheme functions

`accidental->text-markup` *alteration* [Function]
Return accidental glyph markup for *alteration*, to be used in text.

`add-bar-glyph-print-procedure` *glyph proc* [Function]
Specify the single glyph *glyph* that calls print procedure *proc*.

The procedure *proc* has to be defined in the form `(make-...-bar-line is-span grob extent)` even if the arguments *is-span* and *extent* are not used within the routine.

`ly:add-context-mod` *contextmods modification* [Function]
Adds the given context *modification* to the list *contextmods* of context modifications.

`add-grace-property` *context-name grob sym val* [Function]
Set *sym*=*val* for *grob* in *context-name*.

`ly:add-interface` *iface desc props* [Function]
Add a new grob interface. *iface* is the interface name, *desc* is the interface description, and *props* is the list of user-settable properties for the interface.

`ly:add-listener` *callback disp cl* [Function]
Add the single-argument procedure *callback* as listener to the dispatcher *disp*. Whenever *disp* hears an event of class *cl*, it calls *callback* with it.

`add-new-clef` *clef-name clef-glyph clef-position transposition c0-position* [Function]
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` alist. Arguments *clef-glyph* and *c0-position* extend `c0-pitch-alist`.

`ly:add-option` *sym val description rest* [Function]
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 alist 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-boolean`, do the same as with `string` but convert strings `"#f"` and `"#t"` to Boolean values.
- 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* [Function]
Specify the procedure *proc* returning markup for a time signature style *style*. The procedure is called with one argument, the pair (*numerator* . *denominator*).

`add-stroke-glyph` *stencil grob dir stroke-style flag-style* [Function]
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* [Function]
Add an acciaccatura stroke to the given flag stencil.

This is an auxiliary function for `straight-flag`.

`add-to-tag-group` *tag-group tags* [Function]
Add the given *tags* to the existing *tag-group* symbol list.

Returns `#f` if successful, and an error message if the *tag-group* does not exist or if there is a conflicting tag group definition for one of the symbols in *tags*.

`alist->hash-table` *lst* [Function]
Convert alist *lst* to a table.

Warning: The resulting hash table is hashed by identity. This actually corresponds to the `alist->hashq-table` function of Guile's `(ice-9 hash-table)` module, **not** `alist->hash-table`.

`alist-keys` *alist* [Function]
Get the keys of *alist*, not necessarily sorted or unique.

`ly:all-grob-interfaces` [Function]
Return the hash table with all grob interface descriptions.

`ly:all-options` [Function]
Get all option settings in an alist.

`ly:all-output-backend-commands` [Function]
Return the list of extra output backend commands that are used internally in file `lily/stencil-interpret.cc`.

`ly:all-stencil-commands` [Function]
Return the list of stencil commands that can be defined in the output modules (in files `output-*.scm`).

`ly:all-stencil-expressions` [Function]
Return all symbols recognized as stencil expressions.

`allow-volta-hook` *bar-glyph* [Function]
Allow the volta bracket hook being drawn over bar line *bar-glyph*.

`alterations-in-key` *pitch-list* [Function]
Count number of sharps minus number of flats.

`ly:angle` *x y* [Function]
Calculate angle in degrees of given vector. With one argument, *x* is a number pair indicating the vector. With two arguments, *x* and *y* specify the respective coordinates.

`angle-0-2pi` *angle* [Function]
Take *angle* (in radians) and map it between 0 and 2pi.

`angle-0-360` *angle* [Function]
Take *angle* (in degrees) and map it between 0 and 360 degrees.

`ly:append-to-option` *var val* [Function]
Add value *val* to an accumulative program option *var*.

See also function `ly:add-option`.

`apply-tag-operating-markup` *prop-val-modificator music* [Function]
Apply *prop-val-modificator* to tag markup in *music*.

Iterate over `music` to find markups that use the `\tag`-command. Markups are recognized in the music properties `text` and `value` of the iterated music objects. If the value of the property contains tag markups, the `prop-val-modificator` is applied to it and the modified value is updated accordingly.

`approximate-pitch-note-head::calc-direction` *grob* [Function]
Choose a direction for arrow note heads.

This function assumes that the head style is set to `arrow`. When the head is at the end of the stem, which is the expected case, point the head in the opposite direction of the stem. Otherwise, point the head away from the center of the staff.

`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?*.

`ascend-to-context` *m context* [*id* [*mods*]] [Function]
Like `context-spec-music`, but only ascending.

`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.

`bar-line::calc-glyph-name` *grob* [Function]
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* [Function]
Find the glyph name for a bar line. `glyphs` is the list of bar-line types to consider in order. Each must have been defined with `define-bar-line`. *dir* is the break direction to consider: `LEFT` = end of line, `CENTER` = middle of line, `RIGHT` = start of line.

`bar-line::compound-bar-line` *grob bar-glyph extent* [Function]
Build the bar line stencil.

`bar-line::draw-filled-box` *x-ext y-ext thickness extent grob* [Function]
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* [Function]
The print routine for bar lines.

`bar-line::widen-bar-extent-on-span` *grob extent* [Function]
Widen the bar line *extent* towards span bars adjacent to grob *grob*.

`ly:base64-encode` *bv* [Function]
Encode the given bytevector as a base 64 string.

`ly:basic-progress` *str rest* [Function]
A Scheme callable function to issue a basic progress message *str*. The message is formatted with `format`; *rest* holds the formatting arguments (if any).

`beam-exceptions` *time-sig time-signature-settings* [Function]
Get the `beamExceptions` value for *time-sig* from *time-signature-settings*.

time-sig must be a sane, canonical time signature.

`beat-base` *time-sig time-signature-settings* [Function]
Get the `beatBase` value for *time-sig* from *time-signature-settings*.

time-sig must be a sane, canonical time signature.

If there is no entry, derive a value from *time-sig*.

`beat-structure` *base time-sig time-signature-settings* [Function]
Get the `beatStructure` value for *time-sig* from *time-signature-settings*, scaled to *base* units.

time-sig must be a sane, canonical time signature.

If there is no entry, derive a structure from *time-sig*.

`bend::arrow-head-stencil` *thickness x-y-coords height width dir* [Function]
Return an arrow head stencil, calculated from the given dimensions *height* and *width*, and translated to *x-y-coords*, the end of the bend-spanners (curved) line.

`bend::calc-bend-x-begin` *bend-spanner bounding-noteheads factor quarter-tone-diffs* [Function]
Calculate the starting values in x direction of the bend. After a line break, the values from the right bound are taken minus 1.5 staff spaces. For bends-down or if grob property `'style` equals to `'pre-bend`, `'hold` or `'pre-bend-hold`, `interval-center` is applied the topmost note head of the starting note heads. In any other case the right edge of the starting note head is used. The value of `BendSpanner.details.horizontal-left-padding` is added, which may be changed by an appropriate override. Returns a list of the same length as the amount of bend-starting note heads.

`bend::calc-bend-x-end` *bend-spanner top-left-tab-nhd top-right-tab-nhd* [Function]
Calculate the ending x coordinate of *bend-spanner*. At the line end, take the items of `BreakAlignGroup` into account and a little bit of padding. Ends an unbroken spanner or the last of a broken one in the middle of the topmost note head of its bounding note column.

`bend::target-cautionary` *spanner* [Function]
Set `'parenthesized` of all relevant note heads of spanners right bound to `#t`. This procedure is the default value of `'before-line-breaking`.

`bend::text-string` *spanner* [Function]
Take a spanner grob and calculate a list with the quarter tone diffs between the pitches of starting and ending bound. Because bending to different amounts is very unlikely, only the first element of this list is returned as a string.

`bend-spanner::print` *grob* [Function]
Return the final stencil. A line and curve, an arrow head and a text representing the amount a string is bent.

`ly:bezier-extent` *control-points axis* [Function]
Compute the extent of the Bézier curve defined by *control-points* along *axis*.

`ly:bezier-extract` *control-points t-min t-max* [Function]
Return a sub-curve of the Bézier curve defined by *control-points*. The sub-curve is delimited by the curve points indexed by *t-min* and *t-max* (between 0 and 1, 0 = first control point, 1 = last control point). A sub-curve of a Bézier curve is in turn a Bézier curve.

`bit-list->byte-list` *bit-list* [Function]
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* [Function]
Convert the given list of booleans to the number that it represents in binary.

`ly:book?` *x* [Function]
Is *x* a smob of class `Book`?

`ly:book-add-bookpart!` *book-smob book-part* [Function]
Add *book-part* to *book-smob* book part list.

`ly:book-add-score!` *book-smob score* [Function]
Add *score* to *book-smob* score list.

`ly:book-book-parts` *book* [Function]
Return book parts in *book*.

`book-first-page` *layout props* [Function]
Return the `'first-page-number` of the entire book.

`ly:book-header` *book* [Function]
Return header in *book*.

`ly:book-paper` *book* [Function]
Return paper in *book*.

`ly:book-process` *book-smob default-paper default-layout output* [Function]
Print book. *output* is passed to the backend unchanged. For example, it may be a string (for file based outputs) or a socket (for network based output).

`ly:book-process-to-systems` *book-smob default-paper default-layout output* [Function]
Print book. *output* is passed to the backend unchanged. For example, it may be a string (for file based outputs) or a socket (for network based output).

`ly:book-scores` *book* [Function]
Return scores in *book*.

`ly:book-set-header!` *book module* [Function]
Set the book header.

`box-grob-stencil` *grob* [Function]
Make a box of exactly the extents of the grob. The box precisely encloses the contents.

`box-stencil` *stencil thickness padding* [Function]
Add a box around *stencil*, producing a new stencil.

The spacing characteristics are preserved if either a `\hspace` or a `\vspace` command (with either positive or negative values) gets boxed. This means that *padding* and *thickness* added to an empty extent will not participate in spacing and is not recognized by skylines.

`ly:bp` *num* [Function]
num bigpoints (1/72th inch).

`ly:bracket` *a iv t p* [Function]
Make a bracket in direction *a*. The extent of the bracket is given by *iv*. The wings protrude by an amount of *p*, which may be negative. The thickness is given by *t*.

`bracketify-stencil` *stil axis thick protrusion padding* [Function]
Add brackets around *stil*, producing a new stencil.

`break-alignable-interface::self-alignment-of-anchor` *g* [Function]
Return a value for *g*'s `self-alignment-X` that will place *g* on the same side of the reference point defined by a `break-aligned` item such as a `Clef`.

`break-alignable-interface::self-alignment-opposite-of-anchor` *g* [Function]
Return a value for *g*'s `self-alignment-X` that will place *g* on the opposite side of the reference point defined by a `break-aligned` item such as a `Clef`.

`ly:break-alignment-interface::find-nonempty-break-align-group` [Function]
Find the `BreakAlignGroup` with the given break-align-symbol in this `BreakAlignment`. Return `#f` if there is no such group. Also return `#f` if the group has empty `X-extent`, which can happen if it contains only omitted items.

`break-alignment-list` *end-of-line middle begin-of-line* [Function]
Return a callback that calculates a value based on a grob's break direction.

`ly:broadcast` *disp ev* [Function]
Send the stream event *ev* to the dispatcher *disp*.

`byte-list->bit-list` *byte-list* [Function]
Convert a list of bytes (integers between 0 and 255) into a list of bits (booleans).

`caesura-script-interface::before-line-breaking` *script* [Function]
Callback for `CaesuraScript` grob. Eliminate scripts aligned to bar lines if they might collide with a span bar. Some types of bar lines have visible span bars and some don't. For consistent notation, we don't check whether particular `SpanBar` grobs are actually visible, just that they exist.

`caesura-to-bar-line-or-divisio` *context caesura-type observations* [Function]
`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* [Function]
`caesuraTypeTransform` callback to print articulated caesurae as chant breath marks.

`ly:cairo-output-stencil` *basename stencil paper formats* [Function]
dump a single stencil through the Cairo backend

`ly:cairo-output-stencils` *basename stencils header paper formats* [Function]
dump book through cairo backend

`calc-harmonic-pitch` *pitch music* [Function]
Calculate the harmonic pitches in *music* given *pitch* as the non-harmonic pitch.

`calc-measure-length` *time-sig* [Function]
Calculate the measure length for *time-sig*.

time-sig must be a sane, canonical time signature.

`calc-pattern-element` *pattern-list factor* [Function]
First and last relevant value of the probably nested number list *pattern-list*, supposed to be a sorted list, are used to determine how to scale. *factor* is the multiplier for the found value. The returned new list drops the first element of *pattern-list*.

`calc-submeasure-structure` *base time-sig time-signature-settings* [Function]
Get the `submeasureStructure` value for *time-sig*.

Look up the value in *time-signature-settings* and scale it to *base* units. If there is no entry, derive a structure from *time-sig*.

time-sig must be a sane, canonical time signature.

`ly:camel-case->lisp-identifier` *name-sym* [Function]
Convert `FooBar_Bla` to `foo-bar-bla` style symbol.

`centered-spanner-interface::calc-x-offset` *grob* [Function]
Compute the shift from this spanner's reference point to a point centered between two non-musical columns, according to the `spacing-pair` property. This also takes `self-alignment-X` into account. The default for `spacing-pair` is `'(break-alignment . break-alignment)`.

`centered-stencil` *stencil* [Function]
Center stencil *stencil* in both the x and y directions.

`ly:chain-assoc-get` *key achain default-value strict-checking* [Function]
Return value for *key* from a list of alists *achain*. If no entry is found, return *default-value* or `#f` if *default-value* is not specified. With *strict-checking* set to `#t`, a programming error is output in such cases.

`chain-assoc-get` _ _ [_ [_]] [Function]
- LilyPond procedure: ly:chain-assoc-get (SCM key, SCM achain, SCM default_value, SCM strict_checking)

Return value for *key* from a list of alists *achain*. If no entry is found, return *default-value* or `#f` if *default-value* is not specified. With *strict-checking* set to `#t`, a programming error is output in such cases.

`change-pitches` *music converter* [Function]
Recurse through *music*, applying *converter* to pitches. *converter* is typically a transposer or an inverter (see file `scm/modal-transforms.scm`), but may be user-defined. The converter function must take a single pitch as its argument and return a new pitch. These are LilyPond Scheme pitches, e.g., `(ly:make-pitch 0 2 0)`.

`check-context-path` *path* [*location*] *#:default default* [Function]
Check a context property path specification *path*, a symbol list (or a single symbol), for validity and possibly complete it. Returns the completed specification, or `#f` when rising an error (using optionally *location*).

The `#:default` *default* option specifies the context name to return when *path* does not include one. The default is `'Bottom`.

`ly:check-expected-warnings` [Function]
Check whether all expected warnings have really been triggered.

`check-grob-path` *path rest ...* [Function]
Check a grob path specification *path*, a symbol list (or a single symbol), for validity and possibly complete it. Returns the completed specification, or `#f` if invalid, optionally using *location* for an error message. If an optional keyword argument `#:start` *start* is given, the parsing starts at the given index in the sequence '`Context.Grob.property.sub-property...`', with the default of '`0`' implying the full path.

If there is no valid first element of *path* fitting at the given path location, an optionally given `#:default` *default* is used as the respective element instead without checking it for validity at this position.

The resulting path after possibly prepending *default* can be constrained in length by optional arguments `#:min` *min* and `#:max` *max*, defaulting to '`1`' and unlimited, respectively.

`check-music-path` *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-lowercase-name-markup` *pitch lowercase?* [Function]
Return German lowercase note name markup for *pitch*.

Argument *lowercase?* is ignored.

`chord-name:german-markup` *german?* [Function]
Return German note name markup with accidental glyphs for *pitch*.

This function displays pitch B as letter H. If *german?* is not `#f`, display pitch B-flat as letter B. If equal to `#f`, display this pitch as letter B with a flat.

If *lowercase?* is not `#f`, a lowercase note name is returned, otherwise the first character gets capitalized.

This is a callback function for either the `chordRootNamer` or the `chordNoteNamer` context property.

`chord-name:italian-markup` *french?* [Function]
Return Italian note name markup with accidental glyphs for *pitch*.

If *french?* is not `#f`, French note names are returned (for example, 'ré' instead of 're' for pitch D).

If *lowercase?* is not `#f`, a lowercase note name is returned, otherwise the first character gets capitalized.

This is a callback function for either the `chordRootNamer` or the `chordNoteNamer` context property.

`chord-name:markup` *language* [Function]
Return note name markup with accidental glyphs for *pitch*.

Argument *language* sets the language used to display the pitch name (see file `define-note-names.scm` for available values); if this symbol is missing or set to `#f`, the current input language is used.

If *lowercase?* is not `#f`, a lowercase note name is returned, otherwise the first character gets capitalized.

This is a callback function for either the `chordRootNamer` or the `chordNoteNamer` context property.

`chord-name:name-markup` *language* [Function]
Return note name markup for *pitch*.

If *lowercase?* is not `#f`, a lowercase note name is returned, otherwise the first character gets capitalized.

Use function `pitch->name` to get a pitch name without accidentals.

Argument *language* sets the language used to display the pitch name; if this symbol is missing or set to `#f`, the current input language is used.

This is a callback function for either the `chordRootNamer` or the `chordNoteNamer` context property.

`circle-stencil` *stencil thickness padding* [*bbox*] [Function]
Add a circle around *stencil*, producing a new stencil.

If optional argument *bbox* is set to `#t`, use the bounding box of *stencil* as the circle's diameter. Otherwise, use either the width or height of *stencil* (whatever is larger).

`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.

`closest-staff-line` *staff-symbol nhd-staff-pos* [Function]
Return the line-position of *staff-symbol* which is closest to *nhd-staff-pos*.

`ly:cm` *num* [Function]
num cm.

`collect-book-music-for-book` *book music* [Function]
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* [Function]
Make the dispatcher *to* listen to events from *from*.

`construct-chord-elements` *root duration modifications* [Function]
Build a chord on *root* using modifiers in *modifications*. `NoteEvents` have duration *duration*.

Notes: Natural 11 is left from chord if not explicitly specified.

Entry point for the parser.

`ly:context?` *x* [Function]
Is *x* a smob of class `Context`?

`ly:context-alias?` *context name* [Function]
Is *name* the name or an alias of *context*?

`ly:context-children` *context* [Function]
Return a list with the children contexts of *context*.

`ly:context-current-moment` *context* [Function]
Return the current moment of *context*.

`ly:context-def?` *x* [Function]
Is *x* a smob of class `Context_def`?

`ly:context-def-lookup` *def sym val* [Function]
Return the value of *sym* in context definition *def* (e.g., `\Voice`). If no value is found, return *val* or `'()` if *val* is undefined. *sym* can be any of 'default-child', 'consists', 'description', 'aliases', 'accepts', 'property-ops', 'context-name', 'group-type'.

`ly:context-def-modify` *def mod* [Function]
Return the result of applying the context-mod *mod* to the context definition *def*. Does not change *def*.

`ly:context-event-source` *context* [Function]
Return `event-source` of *context*.

`ly:context-events-below` *context* [Function]
Return a `stream-distributor` that distributes all events from *context* and all its subcontexts.

`ly:context-find` *context name* [Function]
Find a context with name or alias *name*, first considering *context* and then searching its ancestors. Return `#f` if not found.

`ly:context-grob-definition` *context name* [Function]
Return the definition of *name* (a symbol) within *context* as an alist.

`ly:context-id` *context* [Function]
Return the ID string of *context*, i.e., for `\context Voice = "one" ...` return the string `one`.

`ly:context-matched-pop-property` *context grob cell* [Function]
This undoes a particular `\override`, `\once \override` or `\once \revert` when given the specific alist pair to undo.

`ly:context-mod?` *x* [Function]
Is *x* a smob of class `Context_mod`?

`ly:context-mod-apply!` *context mod* [Function]
Apply the context modification *mod* to *context*.

`ly:context-name` *context* [Function]
Return the name of *context*, i.e., for `\context Voice = "one" ...` return the symbol `Voice`.

`ly:context-output-def` *context* [Function]
Return the output definition of *context*.

`ly:context-parent` *context* [Function]
Return the parent of *context*, `#f` if none.

`ly:context-property` *context name rest* [Function]
Get the value of property *name* visible in *context*. The first *rest* argument may optionally be an alternative value to return when the property value is `'()`. Following that, there may appear keyword options:

`#:default`
The value to return when the property is not set. When this option is absent, the same value is returned as when the property value is `'()`.

`#:search-ancestors?`
`#f` limits the search to *context*. The default is `#t`.

`ly:context-property-pop` *context name* [Function]
Remove the top entry from the stack for property *name* in context *context* and set or unset the property. If the stack is empty, throw `ly:context-property-stack-underflow` and do not change the property.

`ly:context-property-push` *context name* [Function]
Add the current value (or lack thereof) of property *name* in context *context* to a context-specific stack. The state should be restored later with a paired `ly:context-property-pop` for the same context and property.

`ly:context-property-where-defined` *context name def* [Function]
Return the context above *context* where property *name* is defined, or *def* (defaulting to `'()`) if no such context is found.

`ly:context-pushpop-property` *context grob eltprop val* [Function]
Do `\temporary \override` or `\revert` operation in *context*. The grob definition *grob* is extended with *eltprop* (if *val* is specified) or reverted (if unspecified).

`ly:context-schedule-moment` *context moment* [Function]
Add *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 act at moments not directly created by user input.

`ly:context-set-property!` *context name val* [Function]
Set value of property *name* in *context* to *val*.

`context-spec-music` *m context* [*id* [*mods*]] [Function]
Add `\context` *context* `=` *id* `\with` *mods* to *m*.

`ly:context-unset-property` *context name* [Function]
Unset value of property *name* in *context*.

`copy-repeat-chord` *original-chord repeat-chord duration event-types* [Function]
Copy all events in *event-types* (be sure to include `rhythmic-events`) from *original-chord* over to *repeat-chord* with their articulations filtered as well. Any duration is replaced with the specified *duration*.

`count-list` *lst* [Function]
Given *lst* as `(E1 E2 . . )`, return `((E1 . 1) (E2 . 2) . . . )`.

`create-glyph-flag` *flag-style dir-modifier grob* [Function]
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* [Function]
Set cross-staff property of the stem to this function to connect it to other stems automatically

`cue-substitute` *quote-music* [Function]
Must happen after `quote-substitute`.

`cyclic-base-value` *value cycle* [Function]
Take *value* (for example, an angle) and modulo-maps it between 0 and base *cycle*.

`ly:debug` *str rest* [Function]
A Scheme callable function to issue a debug message *str*. The message is formatted with `format`; *rest* holds the formatting arguments (if any).

`default-flag` *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:

```
\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*).

After definition, *bar-glyph* is accepted as an argument to the `\bar` command. To distinguish bar lines with the same unbroken glyph, *bar-glyph* may be annotated with text after a hyphen, as in the predefined `\bar ".|:-|"` and `\bar ".|:-||"`.

The substitute glyphs may be either strings or booleans.

The value `#f` or the string `"x"` call for no glyph. Unlike `#f`, `"x"` may be annotated and may be used in *bar-glyph*, as in the predefined `\bar "x-."`. The empty string, `""`, calls for a zero-width stencil; it also may be annotated, as in the predefined `\bar "-span|"`.

The value `#t` calls for the same value as *bar-glyph*. Note that this includes any annotations, which can affect things like which span bar is chosen or whether a volta bracket closes.

See Section "List of bar lines" in *Notation Reference*.

`define-deprecated-property` *category-type-symbol deprecated-symbol deprecated-type? #:new-symbol new-symbol #:new->old new->old #:old->new old->new #:warning warning* [Function]
If warning is #f, a default warning will be generated.

`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:

```
(define-markup-command (command layout props arg1 arg2 ...)
                       (type1? type2? ...)
                       [ #:properties ((property1 default1)
                                       (property2 default2)
                                       ...) ]
```

```
[ #:category category ]
[ #:as-string expression ]
[ "doc-string" ]
command-body)
```

This macro defines the markup function *command*-markup. When this function is applied as

```
(command-markup layout props arg1 arg2 ...)
```

it executes *command-body*, a sequence of S-expression similar to the body of a `define` form. The body should return a stencil.

type1?, *type2?*, etc., are type predicates for the arguments *arg1*, *arg2*, etc. *doc-string* is an optional description of the command; this can be retrieved using `procedure-documentation` on *command*-markup, and is used for built-in markup commands to generate the documentation.

Moreover, this macro defines a helper function make-*command*-markup, which can be applied as

```
(make-command-markup arg1 arg2 ...)
```

(without `layout` and `props` arguments). This yields a markup. Interpreting it, using `(interpret-markup` *markup* `layout props)`, invokes *command*-markup as above.

The specified properties are available as `let`-bound variables in the command body, using the respective default value as fallback in case the property is not found in `props`, or `#f` if no default was given. `props` itself is left unchanged: if you want defaults specified in that manner passed down into other markup functions, you need to adjust `props` yourself.

If the `as-string` named argument is given, it should be an expression, which is evaluated by `markup->string` when lossily converting markups to strings. The expression can use all variables available in the main body, namely `layout`, `props`, the arguments, and the properties. However, in many cases `layout` will be `#f` because such an output definition is not available (such as for MIDI output). This case must be accounted for. The expression can recursively call `markup->string`, passing it `#:layout layout #:props props`.

The auto-generated documentation makes use of some optional specifications that are otherwise ignored:

- *category* is either a symbol or a symbol list specifying the categories for this markup command in the docs.
- As an element of the 'properties' list, you may directly use *command*-markup instead of a (*property default*) to indicate that this markup command is called by the newly defined command, adding its properties to the documented properties of the new command. There is no protection against circular definitions.

Some object properties are attached to the resulting *command*-markup function according to the parameters of the definition: `markup-command-signature`, `markup-function-category`, `markup-function-properties`.

`define-markup-list-command ...` [Macro]

Same as `define-markup-command`, but defines a command that, when interpreted, returns a list of stencils instead of a single one.

Markup list commands are recognizable programmatically by having the `markup-list-function?` object property to `#t`.

`define-music-function ...` [Macro]

Define and return a music function. Syntax:

```
(define-music-function (arg1 arg2 ...)
                       (type1? type2? ...)
    function-body)
```

type1?, *type2?*, etc., can take one of the forms `predicate?` for mandatory arguments satisfying the predicate, `(predicate?)` for optional parameters of that type defaulting to `#f`, `(predicate? value)` for optional parameters with a specified default value (evaluated at definition time). An optional parameter can be omitted in a call only when it cannot get confused with a following parameter of different type.

A music function must return a music expression.

`define-scheme-function ...` [Macro]
Like `define-music-function`, but the return type is not restricted to music.

`define-syntax-function ...` [Macro]
Helper macro for `ly:make-music-function`. Syntax:

```
(define-syntax-function result-type?
                        (arg1 arg2 ...)
                        (type1? type2? ...)
  function-body)
```

See `define-music-function` for information on type predicates. `result-type?` can specify a default in the same manner as predicates, to be used in case of a type error in arguments or result.

`define-tag-group` *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.

`ly:deprecation-warning` *str rest* [Function]
Issue the warning *str* about the use of a deprecated feature.

The message is formatted with `format`; *rest* holds the formatting arguments (if any).

Duplicate warnings are suppressed. Duplicates are recognized by the formatted message, not by the format string alone. Including highly variable information in the message (e.g., the arguments passed to a deprecated function) will defeat this check and consume more memory. This function returns `#f` if it did not log the message.

Do not use this function merely as a rate-limited warning. There may be program options affecting the handling of deprecation warnings that are not appropriate for warnings in general.

`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 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.

`direction-scaled` *val* [Function]
Returns *val*, scaled by `'direction` of *grob*. The return value is used for `extra-spacing-height` to push note columns right in `markLengthOn`.

`ly:disconnect-dispatchers` *to from* [Function]
Stop the dispatcher *to* listening to events from *from*.

`ly:dispatcher?` *x* [Function]
Is *x* a smob of class `Dispatcher`?

`display-lily-music` *expr* [*port*] [Function]
Display the music expression *expr* using LilyPond syntax.

`display-music` *music* [*port*] [Function]
Display *music*, not done with `music-map` for clarity of presentation.

`display-scheme-music` *obj* [*port*] [Function]
Display *obj*, typically a music expression, in a friendly fashion, which often can be read back in order to generate an equivalent expression.

`dodecaphonic-no-repeat-rule` *context pitch barnum* [Function]
An accidental rule that typesets an accidental before every note (just as in the dodecaphonic accidental style) *except* if the note is immediately preceded by a note with the same pitch. This is a common accidental style in contemporary notation.

`ly:duration?` *x* [Function]
Is *x* a smob of class `Duration`?

`ly:duration<?` *p1 p2* [Function]
Is *p1* shorter than *p2*?

`ly:duration->moment` *dur* [Function]
Convert *dur* to a `moment` with no grace part.

`ly:duration->number` *dur* [Function]
Convert *dur* to the equivalent number of whole notes.

`ly:duration->string` *dur* [Function]
Convert *dur* to a string.

`ly:duration-compress` *dur factor* [Function]
Compress *dur* by rational *factor*.

`ly:duration-dot-count` *dur* [Function]
Extract the dot count from *dur*.

`duration-dot-factor` *dotcount* [Function]
Given a count of the dots used to extend a musical duration, return the numeric factor by which they increase the duration.

`ly:duration-factor` *dur* [Function]
Extract the compression factor from *dur*. Return it as a pair.

`duration-line::calc` *grob* [Function]
Return list of values needed to print a stencil for `DurationLine`.

`duration-line::print` *grob* [Function]
Return the stencil of `DurationLine`.

`ly:duration-log` *dur* [Function]
Extract the duration log from *dur*.

`duration-log-factor` *lognum* [Function]
Given a logarithmic duration number, return the length of the duration, as a number of whole notes.

`ly:duration-scale` *dur* [Function]
Extract the compression factor from *dur*. Return it as a rational.

`duration-visual` *dur* [Function]
Given a duration object, return the visual part of the duration (base note length and dot count), in the form of a duration object with non-visual scale factor 1.

`duration-visual-length` *dur* [Function]
Given a duration object, return the length of the visual part of the duration (base note length and dot count), as a number of whole notes.

`dynamic-text-spanner::before-line-breaking` *grob* [Function]
Monitor left bound of `DynamicTextSpanner` for absolute dynamics. If found, ensure `DynamicText` does not collide with spanner text by changing `'attach-dir` and `'padding`. Reads the `'right-padding` property of `DynamicText` to fine-tune space between the two text elements.

`ly:effective-prefix` [Function]
Return the top-level directory of LilyPond's data tree.

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?* [Function]
Create hairpin based on a list of *coords* in `(cons x y)` form. `x` is the portion of the width consumed for a given line and `y` is the portion of the height. For example, `'((0 . 0) (0.3 . 0.7) (0.8 . 0.9) (1.0 . 1.0))` means that at the point where the hairpin has consumed 30% of its width, it must be at 70% of its height. Once it is to 80% width, it must be at 90% height. It finishes at 100% width and 100% height. If *coords* does not begin with `'(0 . 0)` the final hairpin may have an open tip. For example '(0 . 0.5) will cause an open end of 50% of the usual height.

mirrored? indicates if the hairpin is mirrored over the y axis or if just the upper part is drawn.

Returns a function that accepts a hairpin grob as an argument and draws the stencil based on its coordinates.

```
#(define simple-hairpin
  (elbowed-hairpin '((0 . 0)(1.0 . 1.0)) #t))

\relative c' {
  \override Hairpin #'stencil = #simple-hairpin
  a\p\< a a a\f
}
```

`ellipse-stencil` *stencil thickness x-padding y-padding* [Function]
Add an ellipse around *stencil*, padded by the padding pair, producing a new stencil.

`end-broken-spanner?` *spanner* [Function]
Is *spanner* broken *and* the last of its broken siblings? See also `unbroken-or-last-broken-spanner?`.

`ly:engraver-announce-end-grob` *engraver grob cause* [Function]
Announce the end of a grob (i.e., the end of a spanner) originating from given *engraver* instance, with *grob* being a grob. *cause* should either be another grob or a music event.

`ly:engraver-make-grob` *engraver grob-name cause* [Function]
Create a grob originating from given *engraver* instance, with given *grob-name*, a symbol. *cause* should either be another grob or a music event.

`ly:engraver-make-item` *engraver grob-name cause* [Function]
Same as `ly:engraver-make-grob`, but always create a grob with the `Item` class. This is useful when the same grob definition is used to create grobs of differing classes.

`ly:engraver-make-spanner` *engraver grob-name cause* [Function]
Same as `ly:engraver-make-grob`, but always create a grob with the `Spanner` class. This is useful when the same grob definition is used to create grobs of differing classes.

`ly:engraver-make-sticky` *engraver grob-name host cause* [Function]
Utility function to create a grob sticking to another grob. This acts like either `ly:engraver-make-item` or `ly:engraver-make-spanner`, depending on the class of the host. Additionally, the host is made the parent of the newly created sticky grob on the y axis and, for items, on the x axis. Sticky spanners take their bounds from their host and their end is announced with the end of the host.

Sticky grobs must have the `sticky-grob-interface` interface, see Section "sticky-grob-interface" in *Internals Reference*.

`ensure-list` *item-or-list-of-items* [Function]
Ensure the argument is a list. If it is not put it in one.

`ly:error` *str rest* [Function]
A Scheme callable function to issue the error *str*. The error is formatted with `format`; *rest* holds the formatting arguments (if any).

`eval-carefully` *symbol module default ...* [Function]
Check whether all symbols in expression *symbol* are reachable in module *module*. In that case evaluate, otherwise print a warning and set an optional *default*.

`ly:event?` *obj* [Function]
Is *obj* a proper (non-rhythmic) `Event` object?

`event-chord-notes` *event-chord* [Function]
Return a list of all notes from *event-chord*.

`event-chord-pitches` *event-chord* [Function]
Return a list of all pitches from *event-chord*.

`event-chord-reduce` *music* [Function]
Reduce event chords in *music* to their first note event, retaining only the chord articulations. Returns the modified music.

`event-chord-wrap!` *music* [Function]
Wrap isolated rhythmic events and non-postevent events in *music* inside of an `EventChord`. Chord repeats 'q' are expanded using the default settings of the parser.

`ly:event-deep-copy` *m* [Function]
Copy *m* and all sub-expressions of *m*.

`event-has-articulation?` *event-type stream-event* [Function]
Is *event-type* in the `articulations` list of the music causing *stream-event*?

`ly:event-length` *event moment* [Function]
Return the length of a stream event. If `moment` is not given, this is just the event's `length` property. If `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 `moment` is returned.

`ly:event-property` *sev sym val* [Function]
Get the property *sym* of stream event *sev*. If *sym* is undefined, return *val* or `'()` if *val* is not specified.

`ly:event-set-property!` *ev sym val* [Function]
Set property *sym* in event *ev* to *val*.

`expand-repeat-chords!` *event-types music* [Function]
Walk through *music* and fill repeated chords (notable by having a duration in `duration`) with the notes from their respective predecessor chord.

`expand-repeat-notes!` *music* [Function]
Walk through *music* and give pitchless notes (not having a pitch in `pitch` or a drum type in `drum-type`) the pitch(es) from the predecessor note/chord if available.

`ly:expect-warning` *str rest* [Function]
Register *str* as an expected warning that should be suppressed.

If this Scheme-callable function does not encounter the given warning, a warning about the missing warning is shown. If the same warning occurs multiple times, this function must be called multiple times, too.

str should usually be tagged as being translated with `(G_ ...)`, and *rest* holds the expected parameter values.

Example:

```
(ly:expect-warning (G_ "Bar number is ~a; expected ~a") 3 15)
```

It is also possible to use a truncated version of the expected warning as the value for *str* (i.e., the beginning of the two strings must match). However, it is recommended to compare *str* with the full message to avoid potential hits with other, almost identical warnings.

`extract-beam-exceptions` *music* [Function]
Create a value useful for setting `beamExceptions` from *music*.

`extract-music` *music pred?* [Function]
Return a flat list of all music matching *pred?* inside of *music*, not recursing into matches themselves.

`extract-named-music` *music music-name* [Function]
Return a flat list of all music named *music-name* (either a single event symbol or a list of alternatives) inside of *music*, not recursing into matches themselves.

`ly:extract-subfont-from-collection` *collection-file-name idx subfont-file-name* [Function]
Extract the subfont of index *idx* in TrueType collection (TTC) or OpenType/CFF collection (OTC) file *collection-file-name* and write it to file *subfont-file-name*.

`extract-typed-music` *music type* [Function]
Return a flat list of all music with *type* (either a single type symbol or a list of alternatives) inside of *music*, not recursing into matches themselves.

`figured-bass-continuation::print` *grob* [Function]
Callback for `BassFigureContinuation` grobs.

`fill-integer-interval` *iv* [Function]
Return a new list based upon *iv*, supposed to be an ordered interval of numbers. This new list contains the interval bounds and every integer between them.

`ly:find-file` *name strict* [Function]
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* [Function]
Used by `\magnifyMusic` and `\magnifyStaff`. If *grob-descriptions* is equal to the `all-grob-descriptions` alist (defined in `scm/define-grobs.scm`), this finds all grobs that can have a value for the *prop-name* property, and return them as a list in the following format:

```
'((grob prop-name)
  (grob prop-name)
  ...)
```

`find-pitch-entry` *keysig pitch accept-global accept-local* [Function]
Return the first entry in *keysig* that matches *pitch* by note name 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* [Function]
The stencil printing procedure for grob `FingerGlideSpanner`. Depending on the grob property `style` several forms of appearance are printed. Possible settings for grob property `style` are `zigzag`, `trill`, `dashed-line`, `dotted-line`, `stub-left`, `stub-right`, `stub-both`, `bow`, `none` and `line`, which is the default.

`first-assoc` *keys lst* [Function]
Return first successful assoc of key from *keys* in *lst*.

`first-broken-spanner?` *spanner* [Function]
Is *spanner* broken *and* the first of its broken siblings? See also `unbroken-or-first-broken-spanner?`.

`first-member` *members lst* [Function]
Return first successful member (of member) from *members* in *lst*.

`flat-flag` *grob* [Function]
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* ... [Function]
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:

```
(flat-zip-longest '(a b c d) '(e f) '(g h i)) ⇒ '(a e g b f h c i d)
```

`flatten-list` *x* [Function]
Unnest list.

`flip-stencil` *axis stil* [Function]
Flip stencil *stil* in the direction of *axis*. Value `X` (or `0`) for *axis* flips it horizontally. Value `Y` (or `1`) flips it vertically. *stil* is flipped in place; its position, the coordinates of its bounding box, remains the same.

`fold-some-music` *pred? proc init music* [Function]
This works recursively on music like `fold` does on a list, calling '(*pred?* `music`)' on every music element. If `#f` is returned for an element, it is processed recursively with the same initial value of '`previous`', otherwise '(*proc* `music previous`)' replaces '`previous`' and no recursion happens. The top *music* is processed using *init* for '`previous`'.

`fold-values` *proc lst inits* ... [Function]
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 *inits* arguments are given after *lst* in the signature, unlike `fold`.

`ly:font-config-add-directory` *dir* [Function]
Add directory *dir* to FontConfig.

`ly:font-config-add-font` *font* [Function]
Add font *font* to FontConfig.

`ly:font-config-display-fonts` *port* [Function]
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* [Function]
Get the file for font *name*, as found by FontConfig.

`ly:font-design-size` *font* [Function]
Given the font metric *font*, return the design size, relative to the current `output-scale`.

`ly:font-file-name` *font* [Function]
Given the font metric *font*, return the corresponding file name.

`ly:font-get-glyph` *font name* [Function]
Return a stencil from *font* for the glyph named *name*. If the glyph is not available, return an empty stencil.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:font-glyph-name-to-index` *font name* [Function]
Return the index for *name* in *font*.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:font-index-to-charcode` *font index* [Function]
Return the character code for *index* in *font*.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:font-magnification` *font* [Function]
Given the font metric *font*, return the magnification, relative to the current `output-scale`.

`ly:font-metric?` *x* [Function]
Is *x* a smob of class `Font_metric`?

`ly:font-name` *font* [Function]
Given the font metric *font*, return the corresponding name.

`font-name-split` *font-name* [Function]
Return (*`font-name` . `design-size`*) from *font-name* string or `#f`.

`for-some-music` *stop? music* [Function]
Walk through *music*, process all elements calling *stop?* and only recurse if this returns `#f`.

`ly:format` *str rest* [Function]
LilyPond specific format function, supporting `~a` and `~[0-9]f`. Basic support for `~s` is also provided.

`ly:format-output` *context* [Function]
Given a global context in its final state, process it and return the `Music_output` object in its final state.

`format-segno-mark-considering-bar-lines` *segno-number context* [Function]
When bar lines incorporate segni, print no mark for the first segno because that would be redundant. Print the usual marks for later segni to avoid ambiguity.

`fret->pitch` *fret* [Function]
Calculate a pitch given *fret* for the harmonic.

`fret-parse-terse-definition-string` *props definition-string* [Function]
Parse a fret diagram string that uses terse syntax; return a pair containing *props*, modified to include the string-count determined by *definition-string*, and a fret indication list with the appropriate values.

`function-chain` *arg function-list* [Function]
Apply a list of functions in *function-list* to *arg*. Each element of *function-list* is structured `(cons function '(arg2 arg3 ...))`. If function takes arguments besides *arg*, they are provided in *function-list*. Example:

```
(function-chain 1 `((,+ 1) (,- 2) (,+ 3) (,/)))
   ⇒ 1/3
```

`generate-crop-stencil` *paper-book* [Function]
Returns a stencil for the cropped output of the given Paper_book

`generate-preview-stencil` *paper-book* [Function]
Returns a stencil for a preview of given Paper_book

`ly:generic-bound-extent` *grob common* [Function]
Determine the extent of *grob* relative to *common* along the x axis, finding its extent as a bound when it a has `bound-alignment-interfaces` property list set and otherwise the full extent.

`ly:get-all-function-documentation` [Function]
Get a hash table with all LilyPond Scheme extension functions.

`ly:get-all-translators` [Function]
Return a list of all translator objects that may be instantiated.

`get-bound-note-heads` *spanner* [Function]
Take a spanner grob and return a pair containing all note heads of the initial starting and the final `NoteColumn`.

`ly:get-cff-offset` *font-file-name idx* [Function]
Get the offset of the 'CFF' table for *font-file-name*, returning it as an integer. The optional *idx* argument is useful for OpenType/CFF collections (OTC) only; it specifies the font index within the OTC. The default value of *idx* is 0.

`get-chord-shape` *shape-code tuning base-chord-shapes* [Function]
Return the chord shape associated with *shape-code* and *tuning* in the hash-table *base-chord-shapes*.

`ly:get-context-mods` *contextmod* [Function]
Returns the list of context modifications stored in *contextmod*.

`ly:get-font-format` *font-file-name idx* [Function]
Get the font format for *font-file-name*, returning it as a symbol. The optional *idx* argument is useful for TrueType Collections (TTC) and OpenType/CFF collections (OTC) only; it specifies the font index within the TTC/OTC. The default value of *idx* is 0.

`ly:get-option` *var* [Function]
Get a global option setting.

`get-postscript-bbox` *string* [Function]
Extract the bounding box from *string*, or return `#f` if not present.

`ly:get-spacing-spec` *from-scm to-scm* [Function]
Return the spacing spec going between the two given grobs, *from-scm* and *to-scm*.

`get-tweakable-music` *mus* [Function]
When tweaking music, return a list of music expressions where the tweaks should be applied. Relevant for music wrappers and event chords.

`glyph-flag` *flag-style* [Function]
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* [Function]
Is *x* a smob of class `Grob`?

`grob::all-objects` *grob* [Function]
Return a list of the names and contents of all properties having type `ly:grob?` or `ly:grob-array?` for all interfaces supported by grob *grob*.

`grob::compose-function` *func data* [Function]
Create a callback entity *func* to be stored in a grob property, based on the grob property data *data* (which can be plain data, a callback itself, or an unpure-pure container).

Function or unpure-pure container *func* accepts a grob and a value and returns another value. Depending on the type of *data*, *func* is used for building a grob callback or an unpure-pure container.

`grob::directional-value` *value-when-negative value-when-positive* [Function]
#:controlling-property controlling-property #:default default
grob callback generator for returning a value depending on the sign of the numeric property identified by the `#:controlling-property` argument.

Values for negative and positive cases are required. The `#:default` argument specifies the return value when the controlling property is zero.

The three possible return values of the callback are stored as a list in the callback's `callback-range` object property from where they can be retrieved for documentation purposes.

`grob::display-objects` *grob* [Function]
Display all objects stored in properties of grob *grob*.

`grob::inherit-parent-property` *axis property default . . .* [Function]
grob callback generator for inheriting a *property* from an *axis* parent, defaulting to *default* if there is no parent or the parent has no setting.

`grob::name` *grob* [Function]
Return the name of the grob *grob* as a symbol.

`grob::offset-function` *func data rest . . .* [Function]
Create a callback entity *func* to be stored in a grob property, based on the grob property data *data* (which can be plain data, a callback itself, or an unpure-pure container).

Function *func* accepts a grob and returns a value that is added to the value resulting from *data*. Optional argument *plus* defaults to '+' but may be changed to allow for using a different underlying accumulation.

If *data* is `#f` or `'()`, it is not included in the sum.

`grob::relay-directional-property` *negative-property* [Function]
positive-property #:controlling-property controlling-property #:default default #:default-property default-property
grob callback generator for returning the value of another property depending on the sign of the numeric property identified by the `#:controlling-property` argument.

The `#:default` argument specifies the value to return when any lookup fails.

Property names for negative and positive cases are required. The optional `#:default-property` argument identifies a property to relay when the controlling value is zero; if none is provided, the default value is returned.

`grob::relay-other-property` *property* [Function]
grob callback generator for returning the value of another property, which is identified by the symbol *property*.

`grob::rhythmic-location` *grob* [Function]
Return a pair consisting of the measure number and moment within the measure of grob *grob*.

`grob::unpure-Y-extent-from-stencil` *pure-function* [Function]
The unpure height will come from a stencil whereas the pure height will come from `pure-function`.

`grob::when` *grob* [Function]
Return the global timestep (a `Moment`) of grob *grob*.

`ly:grob-alist-chain` *grob global* [Function]
Get an alist chain for grob *grob*, with *global* as the global default. If unspecified, there is no global default.

`ly:grob-array?` *x* [Function]
Is *x* a smob of class `Grob_array`?

`ly:grob-array->list` *grob-arr* [Function]
Return the elements of *grob-arr* as a Scheme list.

`ly:grob-array-filter` *predicate grob-arr* [Function]
Like `filter`, return a new grob array containing the elements of *grob-arr* that satisfy *predicate*. Order is preserved.

`ly:grob-array-length` *grob-arr* [Function]
Return the length of *grob-arr*.

`ly:grob-array-ref` *grob-arr index* [Function]
Retrieve the *index*th element of *grob-arr*.

`ly:grob-basic-properties` *grob* [Function]
Get the immutable properties of *grob*.

`ly:grob-chain-callback` *grob proc sym* [Function]
Find the callback that is stored as property *sym* of grob *grob* and chain *proc* to the head of this, meaning that it is called using *grob* and the previous callback's result.

`ly:grob-common-refpoint` *grob other axis* [Function]
Find the common refpoint of *grob* and *other* for *axis*.

`ly:grob-common-refpoint-of-array` *grob others axis* [Function]
Find the common refpoint of *grob* and *others* (a grob-array) for *axis*.

`ly:grob-default-font` *grob* [Function]
Return the default font for grob *grob*.

`ly:grob-extent` *grob refp axis* [Function]
Get the extent in *axis* direction of *grob* relative to the grob *refp*.

`ly:grob-get-vertical-axis-group-index` *grob* [Function]
Get the index of the vertical axis group the grob *grob* belongs to; return `-1` if none is found.

`ly:grob-interfaces` *grob* [Function]
Return the interfaces list of grob *grob*.

`ly:grob-layout` *grob* [Function]
Get `\layout` definition from grob *grob*.

`ly:grob-list->grob-array` *grob-list* [Function]
Convert a Scheme list of grobs to a grob array.

`ly:grob-object` *grob sym val* [Function]
Return the value of a pointer in grob *grob* of property *sym*. When *sym* is undefined in *grob*, it returns *val* if specified or `'()` (end-of-list) otherwise. The kind of properties this taps into differs from regular properties. It is used to store links between grobs, either grobs or grob arrays. For instance, a note head has a `stem` property, the stem grob it belongs to. Just after line breaking, all those grobs are scanned and replaced by their relevant broken versions when applicable.

`ly:grob-original` *grob* [Function]
Return the unbroken original grob of *grob*, *grob* may be an item or spanner.

`ly:grob-parent` *grob axis def* [Function]
Get the parent of *grob*. *axis* is `0` for the x axis, `1` for the y axis. If *grob* has no parent on this axis (yet), return *def*, or `'()` if *def* is not specified.

`ly:grob-pq<?` *a b* [Function]
Compare two grob priority queue entries. This is an internal function.

`ly:grob-properties?` *x* [Function]
Is *x* a smob of class `Grob_properties`?

`ly:grob-property` *grob sym val* [Function]
Return the value for property *sym* of *grob*. If no value is found, return *val* or `'()` if *val* is not specified.

`ly:grob-property-data` *grob sym* [Function]
Return the value for property *sym* of *grob*, but do not process callbacks.

`ly:grob-pure-height` *grob refp beg end val* [Function]
Return the pure height of *grob* given refpoint *refp*. If no value is found, return *val* or `'()` if *val* is not specified.

`ly:grob-pure-property` *grob sym beg end val* [Function]
Return the pure value for property *sym* of *grob*. If no value is found, return *val* or `'()` if *val* is not specified.

`ly:grob-pure-relative-coordinate` *grob refp start end* [Function]
Return the pure vertical coordinate of *grob* relative to *refp* between *start* and *end*.

`ly:grob-relative-coordinate` *grob refp axis* [Function]
Get the coordinate in *axis* direction of *grob* relative to the grob *refp*.

`ly:grob-robust-relative-extent` *grob refp axis* [Function]
Get the extent in *axis* direction of *grob* relative to the grob *refp*, or `(0,0)` if empty.

`ly:grob-script-priority-less` *a b* [Function]
Compare two grobs by script priority. For internal use.

`ly:grob-set-nested-property!` *grob symlist val* [Function]
Set nested property *symlist* in grob *grob* to value *val*.

`ly:grob-set-object!` *grob sym val* [Function]
Set *sym* in grob *grob* to value *val*.

`ly:grob-set-parent!` *grob axis parent-grob* [Function]
Set *parent-grob* as the parent of grob *grob* in axis *axis*.

`ly:grob-set-property!` *grob sym val* [Function]
Set *sym* in grob *grob* to value *val*.

`ly:grob-spanned-column-rank-interval` *grob* [Function]
Return a pair with the `rank` of the furthest left column and the `rank` of the furthest right column spanned by `grob`.

`ly:grob-staff-position` *sg* [Function]
Return the y position of *sg* relative to the staff.

`ly:grob-suicide!` *grob* [Function]
Kill *grob*.

`ly:grob-system` *grob* [Function]
Return the system grob of *grob*.

`grob-transformer` *property func* [Function]
Create an override value good for applying *func* to either pure or unpure values. *func* is called with the respective grob as first argument and the default value (after resolving all callbacks) as the second.

`ly:grob-translate-axis!` *grob d a* [Function]
Translate *grob* on axis *a* over distance *d*.

`ly:grob-vertical<?` *a b* [Function]
Does *a* lie above *b* on the page?

`group-into-ranges` *lst* [Function]
Turn a (possibly unsorted) list of integers into a sorted list of ranges, represented as pairs. For example:

```
(group-into-ranges '(1 4 3 6 7 2)) ⇒ ((1 . 4) (6 . 7))
```

`ly:gulp-file` *filename* [*size*] [Function]
Same as `ly:gulp-file-utf8`, but decode the file as Latin 1. Warning: this is rarely what you want; consider using `ly:gulp-file-utf8` instead.

`ly:gulp-file-utf8` *filename* [*size*] [Function]
Find a file on the search path (with `ly:find-file`), and return its contents decoded as UTF-8. Raise an error if the file is not found.

If the optional argument *size* is given, read at most *size* characters (*not* bytes) from the file.

`ly:has-glyph-names?` *font-file-name idx* [Function]
Does the font for *font-file-name* have glyph names? The optional *idx* argument is useful for TrueType Collections (TTC) and OpenType/CFF collections (OTC) only; it specifies the font index within the TTC/OTC. The default value of *idx* is 0.

`ly:hash-table-keys` *tab* [Function]
Return a list of keys in *tab*.

`headers-property-alist-chain` *headers* [Function]
Take a list of `\header` blocks (Guile modules). Return an alist chain containing all of their bindings where the names have been prefixed with `header:`. This alist chain is suitable for interpreting a markup in the context of these headers.

`hook-stencil` *x y staff-space thick blot grob* [Function]
Return a hook stencil where *x* determines the horizontal position and *y* determines the basic vertical position. The final stencil is adjusted vertically using *staff-space*, which is `StaffSymbol`'s staff space, and uses *blot*, which is the current `'blot-diameter`. The stencil's thickness is usually taken from *grob* `'details`, *thick* serves as a fallback value.

`horizontal-script::calc-staff-position` *val* [Function]
Set `staff-position` for horizontal script definitions in the alist for context property `scriptDefinitions`. This opens the possibility to set `Y-offset` or `staff-position` by `override` or `tweak`. Directly setting `Y-offset` in script definitions blocks this. *val* should usually be zero, but can be any other number in order to insert some offset from zero in y-axis direction.

`horizontal-script::extra-spacing-height` *grob* [Function]
Set `extra-spacing-height` for horizontal script to `item::extra-spacing-height-including-staff` to avoid overlapping with surrounding note columns.

`ly:in-event-class?` *ev cl* [Function]
Does event *ev* belong to event class *cl*?

`ly:inch` *num* [Function]
num inches.

`index-map` *f lsts ...* [Function]
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* [Function]
Return input location in *sip* as

```
(file-name first-line first-column last-line last-column)
```

`ly:input-file-line-char-column` *sip* [Function]
Return input location in *sip* as `(file-name line char column)`.

`ly:input-location?` *x* [Function]
Is *x* a smob of class `Input`?

`ly:input-message` *sip msg rest* [Function]
Print *msg* as a GNU compliant error message, pointing to the location in *sip*. *msg* is interpreted similar to `format`'s argument, using *rest*.

`ly:input-warning` *sip msg rest* [Function]
Print *msg* as a GNU compliant warning message, pointing to the location in *sip*. *msg* is interpreted similar to `format`'s argument, using *rest*.

`int->bit-list` *n* [*pad-length*] [Function]
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` _ _ _ [Function]
- 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* [Function]
Interpret the music expression *mus* in the global context *ctx*. The context is returned in its final state.

`interval-center` *x* [Function]
Center the number pair *x*, if an interval.

`interval-index` *interval dir* [Function]
Interpolate *interval* between between left (*dir*=`-1`) and right (*dir*=`+1`).

`interval-length` *x* [Function]
Length of the number pair *x*, if an interval.

`ly:intlog2` *d* [Function]
The 2-logarithm of $1/d$.

`invalidate-alterations` *context* [Function]
Invalidate alterations in *context*.

Elements of `'localAlterations` corresponding to local alterations of the key signature have the form `'((octave . notename) . (alter barnum . end-mom))`. Replace them with a version where `alter` is set to `'clef` to force a repetition of accidentals.

Entries that conform with the current key signature are not invalidated.

`ly:item?` *g* [Function]
Is *g* an `Item` object?

`item::extra-spacing-height-including-staff` *grob* [Function]
Return a value for `extra-spacing-height` that augments the extent of the grob to the extent of the staff.

`ly:item-break-dir` *it* [Function]
The break status direction of item *it*. `-1` means end of line, `0` unbroken, and `1` beginning of line.

`ly:item-get-column` *it* [Function]
Return the `PaperColumn` or `NonMusicalPaperColumn` associated with this `Item`.

`ly:iterator?` *x* [Function]
Is *x* a smob of class `Music_iterator`?

`layout-line-thickness` *grob* [Function]
Get the line thickness of the *grob*'s corresponding layout.

`layout-set-absolute-staff-size` *sz* [Function]
Set the absolute staff size inside of a `\layout{}` block. *sz* is in points.

`layout-set-staff-size` *sz* [Function]
Set the staff size inside of a `\layout{}` block. *sz* is in points.

`ledger-lines::positions-from-ledgered-grob` *ledgered-grob staff-pos* [Function]
Reading properties from `StaffSymbol`, calculate positions of ledger lines for grobs with `'staff-position` *staff-pos*. `'ledger-extra` may be taken from *ledgered-grob*.

`left-align-at-split-notes` *grob* [Function]
Left-align `LyricText` if the parent `NoteHead` is split by `Completion_heads_engraver`

`ly:length` *x y* [Function]
Calculate magnitude of given vector. With one argument, *x* is a number pair indicating the vector. With two arguments, *x* and *y* specify the respective coordinates.

`ly:lily-lexer?` *x* [Function]
Is *x* a smob of class `Lily_lexer`?

`ly:lily-parser?` *x* [Function]
Is *x* a smob of class `Lily_parser`?

`lilypond-main` *files* [Function]
Entry point for LilyPond.

`lilypond-version-outdated?` *file-version lily-version* [Function]
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* [Function]
Make a line using layout information from grob *grob*.

`list-insert-separator` *lst between* [Function]
Create new list, inserting *between* between elements of *lst*.

`list-join` *lst intermediate* [Function]
Put *intermediate* between all elements of *lst*.

`list-map` *function ls* [Function]
Apply *function* to the probably nested list *ls* and all of it sublists. First it recurses over the children, then the function is applied to *ls*.

`list-pad-left` *lst len filler fillers ...* [Function]
Same as `list-pad-right`, but add padding on the left.

`list-pad-right` *lst len filler fillers ...* [Function]
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 d)
```

`ly:listened-event-class?` *disp cl* [Function]
Does *disp* listen to any event type in the list *cl*?

`ly:listened-event-types` *disp* [Function]
Return a list of all event types that *disp* listens to.

`ly:listener?` *x* [Function]
Is *x* a smob of class `Listener`?

`lookup-markup-command` *code* [Function]
Return (*function* . *signature*) for a markup command *code*, or return `#f`.

`lyric-hyphen::vaticana-style` *grob* [Function]
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* [Function]
Allow interpretation of tilde characters as lyric ties.

`make-accidental-dodecaphonic-rule` *octaveness laziness* [Function]
Variation on function make-accidental-rule that creates an dodecaphonic accidental rule.

`make-accidental-rule` *octaveness laziness* [Function]
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* [Function]
Make a `\book` of *paper* and *header* (which may be `#f` as well) containing `\scores`.

`ly:make-book-part` *scores* [Function]
Make a `\bookpart` containing `\scores`.

`make-bow-stencil` *start stop thickness angularity bow-height orientation* [Function]
Create a bow stencil. It starts at point *start*, ends at point *stop*. *thickness* is the thickness of the bow. The higher the value of number *angularity*, the more angular the shape of the bow. *bow-height* determines the height of the bow. *orientation* determines whether the bow is concave or convex. Both variables are supplied to support independent usage.

Done by calculating a horizontal unit bow first, then moving all control points to the correct positions. Limitation: s-curves are currently not supported.

`make-c-time-signature-markup` *spec* [Function]
Make markup for the 'C' time signature style.

`make-circle-stencil` *radius thickness fill* [Function]
Make a circle of radius *radius* and thickness *thickness*.

`make-clef-set` *clef-name* [Function]
Generate the clef setting commands for a clef named *clef-name*.

`make-connected-line` *points grob* [Function]
Take a list of points, *points*. Return a line connecting *points*, using `ly:line-interface::line` and getting layout information from *grob*.

`make-connected-path-stencil` *pointlist thickness x-scale y-scale connect fill* [Function]
Make a connected path described by the list *pointlist*, beginning at point (0, 0), with thickness *thickness*, and scaled by *x-scale* in the x direction and *y-scale* in the y direction. *connect* and *fill* are boolean arguments that specify whether the path should be connected or filled, respectively.

`ly:make-context-mod` *mod-list* [Function]
Create a context modification, optionally initialized via the list of modifications *mod-list*.

`make-cue-clef-set` *clef-name* [Function]
Generate the clef setting commands for a cue clef with name *clef-name*.

`make-cue-clef-unset` [Function]
Reset the clef settings for a cue clef.

`ly:make-dispatcher` [Function]
Return a newly created dispatcher.

`ly:make-duration` *length dotcount num den* [Function]
Make a duration. *length* is the negative logarithm (base 2) of the duration: 1 is a half note, 2 is a quarter note, 3 is an eighth note, etc. The number of dots after the note is given by the optional argument *dotcount*.

The duration factor is optionally given by integers *num* and *den*, alternatively by a single rational number.

A duration is a musical duration, i.e., a length of time described by a power of two (whole, half, quarter, etc.) and a number of augmentation dots.

`make-duration-of-length` *moment* [Function]
Make duration of the given `moment` length.

`make-ellipse-stencil` *x-radius y-radius thickness fill* [Function]
Make an ellipse of x radius *x-radius*, y radius `y-radius`, and thickness *thickness* with fill defined by `fill`.

`make-engraver ...` [Macro]
Like `make-translator`, but create an engraver, i.e., the resulting translator is only run in layout output and ignored in MIDI.

`make-filled-box-stencil` *xext yext* [Function]
Make a filled box.

`ly:make-global-context` *output-def* [Function]
Set up a global interpretation context, using the output block *output-def*. The context is returned.

`ly:make-global-translator` *global* [Function]
Create a translator group and connect it to the global context *global*. The translator group is returned.

`make-glyph-time-signature-markup` *style fraction* [Function]
Make markup for a symbolic time signature of the form `timesig.<`*`style`*`><`*`numerator`*`><`*`denominator`*`>`, for example '`timesig.mensural34`'. If the music font does not have a glyph for the requested style and fraction, issue a warning and make a numbered time signature instead.

`ly:make-grob-properties` *alist* [Function]
Package the given property list *alist* in a grob property container stored in a context property with the name of a grob.

`make-grob-property-override` *grob gprop val* [Function]
Make a `Music` expression that overrides *gprop* to *val* in *grob*. This is a `\temporary \override`, making it possible to `\revert` to any previous value afterwards.

`make-grob-property-revert` *grob gprop* [Function]
Revert the grob property *gprop* for *grob*.

`make-grob-property-set` *grob gprop val* [Function]
Make a `Music` expression that overrides a *gprop* to *val* in *grob*. Does a pop first, i.e., this is not a `\temporary \override`.

`make-harmonic` *mus* [Function]
Convert music variable *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 *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 `music-properties`, a list of alternating property symbols and values. Example:

```
(make-music 'OverrideProperty
            'symbol 'Stem
            'grob-property 'thickness
            'grob-value (* 2 1.5))
```

Instead of a successive symbol and value, an entry in the list may also be an alist or a music object in which case its elements, respectively its *mutable* property list (properties not inherent to the type of the music object), are taken.

The argument list will be interpreted left to right, so later entries override earlier ones.

`ly:make-music-function` *signature func* [Function]
Make a function to process music, to be used for the parser. *func* is the function, and *signature* describes its arguments. *signature*'s cdr is a list containing either `ly:music?` predicates or other type predicates. Its car is the syntax function to call.

`ly:make-music-relative!` *music pitch* [Function]
Make *music* relative to *pitch*, return final pitch.

`ly:make-output-def` [Function]
Make an output definition.

`make-oval-stencil` *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` *label* [Function]
Return page marker with label *label*.

`ly:make-page-permission-marker` *symbol permission* [Function]
Return page marker with page breaking and turning permissions.

`ly:make-paper-outputter` *port alist default-callback* [Function]
Create an outputter dumping to *port*. *alist* should map symbols to procedures. See file `output-ps.scm` for an example. If *default-callback* is given, it is called for unsupported expressions.

`make-part-combine-context-changes` *state-machine split-list* [Function]
Generate a sequence of part combiner context changes from a split list.

`make-part-combine-marks` *split-list* [*get-next-state*] [Function]
Generate a sequence of segments alternating skips and part-combine-events for each active voice. There may be an initial skip that is not specced to any Voice context.

`make-partial-ellipse-stencil` *x-radius y-radius start-angle end-angle thick connect fill* [Function]
Create an elliptical arc. *x-radius* is the x radius of the arc. *y-radius* is the y radius of the arc. *start-angle* is the starting angle of the arc (in degrees). *end-angle* is the ending angle of the arc (in degrees). *thick* is the thickness of the line. *connect* is a boolean flag indicating whether the end should be connected to the start by a line. *fill* is a boolean flag indicating whether the shape should be filled.

`make-path-stencil` *path thickness x-scale y-scale fill #:line-cap-style line-cap-style #:line-join-style line-join-style* [Function]
Make a stencil based on the path described by the list *path*, with thickness *thickness*, and scaled by *x-scale* in the x direction and *y-scale* in the y direction (the difference with scaling the resulting stencil using `ly:stencil-scale` is that this scaling does not change the thickness). *fill* is a boolean argument that specifies whether the path should be filled. Valid path commands are

```
moveto rmoveto lineto rlineto curveto rcurveto closepath
```

and their standard SVG single-letter equivalents

```
M m L l C c Z z
```

`make-performer ...` [Macro]
Like `make-translator`, but create a performer, i.e., the resulting translator is only run in MIDI and ignored in layout output. Scheme performers do not support acknowledgers and `process-acknowledged`.

`ly:make-pitch` *octave note alter* [Function]
Make a pitch. *octave* is specified by an integer, zero for the octave containing middle C. *note* is a number indexing the global default scale, with 0 corresponding to pitch C and 6 usually corresponding to pitch B. Optional *alter* is a rational number of 200-cent whole tones for alteration.

`ly:make-prob` *type init rest* [Function]
Create a `Prob` object.

`ly:make-rand-seed` [Function]
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* [Function]
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 ...` [Macro]
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 using '`#`' 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'' g'
}
```

`make-repeat` *name times main alts* [Function]
Create a repeat music expression, with all properties initialized properly.

`ly:make-rotation` *angle center* [Function]
Make a transform rotating by *angle* in degrees. If *center* is given as a pair of coordinates, it is the center of the rotation, otherwise the rotation is around (0, 0).

`ly:make-scale` *steps* [Function]
Create a scale. The argument is a vector of rational numbers, each of which represents the number of 200-cent tones of a pitch above the tonic.

`ly:make-scaling` *scale scaley* [Function]
Create a scaling transform from argument *scale* and optionally *scaley*. When both arguments are given, they must be real and give the scale in x and y direction. If only *scale* is given, it may also be complex to indicate a scaled rotation in the manner of complex number rotations, or a pair of reals for specifying different scales in x and y direction like with the first calling convention.

`ly:make-score` *music* [Function]
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* [Function]
Convert *pitches*, an unordered list of note values covering (after disregarding octaves) all absolute pitches in need of conversion, into a function converting semitone numbers (absolute pitch missing enharmonic information) back into note values.

For a key signature without accidentals

```
c cis d es e f fis g gis a bes b
```

might be a good choice, covering Bb major to A major and their parallel keys, and melodic/harmonic C minor to A minor.

`ly:make-skyline` *segments axis direction* [Function]
Create a new skyline from a list of segments. A skyline is an object representing an outline along a 'horizon axis', much like a city skyline. The argument *segments* is a list of segments. A segment has the form `'((x1 . y1) . (x2 . y2))`. The resulting skyline, viewed on the given *axis*, has a builing joining these two points for each segment. *x1*, *y1*, *x2*, *y2* may be infinite. The buildings can be given in any order, and overlap.

`ly:make-spring` *ideal min-dist* [Function]
Make a spring. *ideal* is the ideal distance of the spring, and *min-dist* is the minimum distance.

`ly:make-stencil` *expr xext yext* [Function]
Stencils are device independent output expressions. They carry two pieces of information:

1. A specification of how to print this object. This specification is processed by the output backends, for example `scm/output-ps.scm`.
2. The vertical and horizontal extents of the object, given as pairs. If an extent is unspecified (or if you use `empty-interval` as its value), it is taken to be empty.

`make-stencil-boxer` *thickness padding callback* [Function]
Return function that adds a box around the grob passed as argument.

`make-stencil-circler` *thickness padding callback* [Function]
Return function that adds a circle around the grob passed as argument.

`ly:make-stream-event` *cl proplist* [Function]
Create a stream event of class *cl* with the given mutable property list.

`make-tmpfile` *dir* [Function]
Return a temporary file (as a Scheme port). If *dir* is `#f`, a file in the directory given by the environment variable `$TMPDIR` is created.

`ly:make-tmpfile-name` *filename* [Function]
Return *filename*, suffixed by a randomly generated, hexadecimal id.

`ly:make-transform` *xx yx xy yy x0 y0* [Function]
Create a transform. Without options, it is the identity transform. Given four arguments *xx*, *yx*, *xy*, and *yy*, it is a linear transform. Given six arguments (with *x0* and *y0* last), it is an affine transform.

Transforms can be called as functions on other transforms (concatening them) or on points given either as complex number or real number pair. See also `ly:make-rotation`, `ly:make-scaling`, and `ly:make-translation`.

`ly:make-translation` *x y* [Function]
Make a transform translating by *x* and *y*. If only *x* is given, it can also be a complex number or a pair of numbers indicating the offset to use.

`make-translator ...` [Macro]

Helper macro for creating Scheme translators usable in both '`\midi`' and '`\layout`'.

The usual form for a translator is an association list (or alist) mapping symbols to either anonymous functions or to another such alist.

`make-translator` accepts forms where the first element is either an argument list starting with the respective symbol, followed by the function body (comparable to the way `define` is used for defining functions), or a single symbol followed by subordinate forms in the same manner. You can also just make an alist pair literally (the '`car`' is quoted automatically) as long as the unevaluated '`cdr`' is not a pair. This is useful if you already have defined your engraver functions separately.

Symbols mapping to a function would be `initialize`, `start-translation-timestep`, `pre-process-music`, `process-music`, `stop-translation-timestep`, and `finalize`. Symbols mapping to another alist specified in the same manner are `listeners` with the subordinate symbols being event classes.

A template for writing a translator with all methods is:

```
(lambda (context)
  (let (local-variables ...)
    (make-translator
     ((initialize translator)
      ...)
     ((start-translation-timestep translator)
      ...)
     (listeners
      ((event-class-1 translator event)
       ...)
      ((event-class-2 translator event #:once)
       ...))
     ((process-music translator)
      ...)
     (acknowledgers
      ((grob-interface-1 translator grob source-translator)
       ...)
      ((grob-interface-2 translator grob source-translator)
       ...))
     ((process-acknowledged translator)
      ...)
     ((stop-translation-timestep translator)
      ...)
     ((finalize translator)
      ...))))
```

This can be used as the argument to `\consists`.

For `listeners`, a special feature is available: the argument list of a listener can be terminated with the keyword `#:once`. This makes for a listener that is only ever triggered once per time step. If it receives several events in the same time step, it emits a warning, except if they are all equal (where equality is checked recursively, with `equal?`).

`make-transparent-box-stencil` *xext yext* [Function]

Make a transparent box.

`ly:make-unpure-pure-container` *unpure pure* [Function]
Make an unpure-pure container. *unpure* should be an unpure expression, and *pure* should be a pure expression. If *pure* is omitted, the value of *unpure* will be used twice, except that a callback is given two extra arguments that are ignored for the sake of pure calculations.

`map-selected-alist-keys` *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*.

`marked-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.

`marked-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` ... [Macro]
The `markup` macro provides a LilyPond-like syntax for building markups using Scheme keywords, replacing `\`*command* with `#:`*command*. For example, this:

```
\markup { foo
          \raise #0.2 \hbracket \bold bar
          \override #'(baseline-skip . 4)
          \bracket \column { baz bazr bla }
}
```

translates to this:

```
(markup "foo"
        #:raise 0.2 #:hbracket #:bold "bar"
        #:override '(baseline-skip . 4)
        #:bracket #:column ("baz" "bazr" "bla"))
```

`markup->string` *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.

`markup-command-list?` *x* [Function]
Check whether *x* is a markup command list, i.e., a list composed of a markup list function and its arguments.

`markup-default-to-string-method` *layout props args ...* [Function]
The default `markup->string` handler for markups, used when `markup->string` encounters a markup that has no special `as-string` expression defined. This applies `markup->string` on all markup arguments and joins the results, separating them with spaces.

`markup-lambda` ... [Macro]
Defines and returns an anonymous markup command. Other than not registering the markup command, this is identical to `define-markup-command`.

`markup-list?` *arg* [Function]
Return a true value if *x* is a list of markups or markup command lists.

`markup-list-lambda` ... [Macro]
Same as `markup-lambda` but defines a markup list command that, when interpreted, returns a list of stencils instead of a single one.

`matrix-rotate-counterclockwise` *matrix* [Function]
Return a copy of *matrix* rotated counterclockwise. *matrix* is a 2-dimensional array without non-zero lower bounds in its shape.

`measure-counter::text` *grob* [Function]
A number for a measure count. Broken measures are numbered in parentheses. When the counter spans several measures (like with compressed multi-measure rests), it displays a measure range.

`mensural-flag` *grob* [Function]
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.mensural`*DirTypeLog*. *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.

`ly:message` *str rest* [Function]
A Scheme callable function to issue the message *str*. The message is formatted with `format`; *rest* holds the formatting arguments (if any).

`middle-broken-spanner?` *spanner* [Function]
Is *spanner* broken and among the middle broken pieces (i.e., neither the first nor the last)?

`midi-program` *instrument* [Function]
Return the program of the instrument.

`ly:minimal-breaking` *paper-book* [Function]
Break (pages and lines) the `Paper_book` object *paper-book* without looking for optimal spacing: stack as many lines on a page before moving to the next one.

`minmax/cmp` *cmp arg args* ... [Function]
Like `min` or `max`, but applies to any type of values, comparing them with *cmp* instead of < or >. For example:

```
(minmax/cmp (comparator-from-key string-length <) "a" "aa" "aaa")
⇒ "a"
(minmax/cmp (comparator-from-key string-length >) "a" "aa" "aaa")
⇒ "aaa"
```

`ly:mm` *num* [Function]
num mm.

`mmrest-of-length` *mus* [Function]
Create a multi-measure rest of exactly the same length as *mus*.

`modern-straight-flag` *grob* [Function]
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 `old-straight-flag`. 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.

`ly:module->alist` *mod* [Function]
Dump the contents of module *mod* as an alist.

`ly:module-copy` *dest src* [Function]
Copy all bindings from module *src* into *dest*.

`ly:modules-lookup` *modules sym def* [Function]
Look up *sym* in the list *modules*, returning the first occurrence. If not found, return *def* or `#f` if *def* isn't specified.

`ly:moment?` *x* [Function]
Is *x* a smob of class `Moment`?

`ly:moment<?` *a b* [Function]
Compare two moments.

`ly:moment-add` *a b* [Function]
Add two moments.

`ly:moment-div` *a b* [Function]
Divide moment *a* by a number *b* (or by the main part of another moment).

`ly:moment-grace` *mom* [Function]
Extract grace timing as a rational number from *mom*.

`ly:moment-grace-denominator` *mom* [Function]
Extract denominator from grace timing.

`ly:moment-grace-numerator` *mom* [Function]
Extract numerator from grace timing.

`ly:moment-main` *mom* [Function]
Extract main timing as a rational number from *mom*.

`ly:moment-main-denominator` *mom* [Function]
Extract denominator from main timing.

`ly:moment-main-numerator` *mom* [Function]
Extract numerator from main timing.

`ly:moment-mod` *a b* [Function]
Modulo of two moments.

`ly:moment-mul` *a b* [Function]
Multiply moment *a* by a number *b* (or by the main part of another moment).

`ly:moment-sub` *a b* [Function]
Subtract two moments.

`ly:music?` *obj* [Function]
Is *obj* a `Music` object?

`music->make-music` *obj* [Function]
Generate an expression that, once evaluated, may return an object equivalent to *obj*, that is, for a music expression, a `(make-music ...)` form.

`music-clone` *music music-properties ...* [Function]
Clone *music* and set properties according to *music-properties*, a list of alternating property symbols and values:

```
(music-clone start-span 'span-direction STOP)
```

Only properties that are not overridden by *music-properties* are actually fully cloned.

`ly:music-compress` *mus scale* [Function]
Compress *mus* by *scale*.

`ly:music-deep-copy` *m origin* [Function]
Copy *m* and all sub expressions of *m*. *m* may be an arbitrary type; cons cells and music are copied recursively. If *origin* is given, it is used as the origin for one level of music by calling `ly:set-origin!` on the copy.

`ly:music-duration-compress` *mus fact* [Function]
Compress *mus* by factor *fact*, which is a `Moment`.

`ly:music-duration-length` *mus* [Function]
Extract the duration field from *mus* and return the length.

`music-filter` *pred? music* [Function]
Filter out music expressions that do not satisfy *pred?*.

`ly:music-function?` *x* [Function]
Is *x* a smob of class `Music_function`?

`ly:music-function-extract` *x* [Function]
Return the Scheme function inside *x*.

`ly:music-function-signature` *x* [Function]
Return the function signature inside *x*.

`music-is-of-type?` *mus type* [Function]
Does *mus* belong to the music class *type*?

`ly:music-length` *mus* [Function]
Return the duration of *mus* as a `ly:moment`.

`ly:music-list?` *lst* [Function]
Is *lst* a list of music objects?

`music-map` *function music* [Function]
Apply *function* to *music* and all of the music it contains.

First it recurses over the children, then the function is applied to *music*.

`ly:music-mutable-properties` *mus* [Function]
Return an alist containing the mutable properties of *mus*. The immutable properties are not available, since they are constant and initialized by the `make-music` function.

`ly:music-output?` *x* [Function]
Is *x* a smob of class `Music_output`?

`music-pitches` *music* [Function]
Return a list of all pitches from *music*.

`ly:music-property` *mus sym val* [Function]
Return the value for property *sym* of music expression *mus*. If no value is found, return *val* or `'()` if *val* is not specified.

`music-selective-filter` *descend? pred? music* [Function]
Recursively filter out music expressions that do not satisfy *pred?*, but refrain from filtering the subexpressions of music that does not satisfy *descend?*.

`music-selective-map` *descend? function music* [Function]
Apply *function* recursively to *music*, but refrain from mapping subexpressions of music that does not satisfy *descend?*.

`music-separator?` *m* [Function]
Is *m* a separator?

`ly:music-set-property!` *mus sym val* [Function]
Set property *sym* in music expression *mus* to *val*.

`ly:music-start` *mus* [Function]
Get the start of music expression *mus* and return it as a `Moment` object.

`ly:music-transpose` *m p* [Function]
Transpose *m* such that central C is mapped to *p*. Return *m*.

`music-type-predicate` *types* [Function]
Return a predicate function that can be used for checking music to have one of the types listed in *types*.

`neo-modern-accidental-rule` *context pitch barnum* [Function]
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.

`no-flag` *grob* [Function]
A callback for function `default-flag`, indicating 'no flag'.

This function simply returns an empty stencil.

`ly:non-fatal-error` *str rest* [Function]
A Scheme callable function to issue the error *str*. The error is formatted with `format`; *rest* holds the formatting arguments (if any). When using this function, some way of signalling the error should be employed in order for the compilation to eventually result in a nonzero return code.

`normal-flag` *grob* [Function]
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* [Function]
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* [Function]
Is *spanner* broken *and* not the first of its broken siblings? The name is read "(not first) and broken".

`not-last-broken-spanner?` *spanner* [Function]
Is *spanner* broken *and* not the last of its broken siblings? The name is read "(not last) and broken".

`ly:note-column-accidentals` *note-column* [Function]
Return the `AccidentalPlacement` grob from *note-column* if any, or `SCM_EOL` otherwise.

`ly:note-column-dot-column` *note-column* [Function]
Return the `DotColumn` grob from *note-column* if any, or `SCM_EOL` otherwise.

`ly:note-extra-source-file` *filename parser* [Function]
Register a file, e.g., an image file, as being needed to compile the current file. This is used for the `-dembed-source-code` option. A parser may optionally be specified.

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* [Function]
Get stem attachment point from *font_metric* for *glyph-name*.

This only works for note head glyphs. Depending on *direction*, the attachment point for an up-stem or a down-stem is returned. *direction* defaults to `UP` if not specified.

The return value is a pair, where each component is measured in a -1 to 1 scale so that -1 is the left/bottom edge of the note head's bounding box and 1 is the right/top edge.

`ly:note-scale?` *x* [Function]
Is *x* a smob of class `Scale`?

`note-to-cluster` *music* [Function]
Replace `NoteEvents` by `ClusterNoteEvents`.

`ly:number->duration` *x* [Function]
Convert a duration expressed in units of whole notes to a `ly:duration`. The log, number of dots, and scaling factor are chosen automatically.

`ly:number->string` *s* [Function]
Convert *s* to a string without generating many decimals.

`number-format` *number-type num custom-format ...* [Function]
Print *num* according to the requested *number-type*. Choices include `arabic`, `custom`, `roman-ij-lower`, `roman-ij-upper`, `roman-lower` (the default), and `roman-upper`.

For `custom`, *custom-format* must be present; it gets applied to *num*.

`offset-fret` *fret-offset diagram-definition* [Function]
Add *fret-offset* to each fret indication in *diagram-definition* and return the resulting verbose `fret-diagram-definition`.

`offsetter` *property offsets* [Function]
Apply *offsets* to the default values of *property* of *grob*. Offsets are restricted to immutable properties and values of type `number`, `number-pair`, or `number-pair-list`.

`old-straight-flag` *grob* [Function]
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.

`ly:one-line-auto-height-breaking` *paper-book* [Function]
Put each score on a single line, and put each line on its own page. Modify the `paper-width` setting so that every page is wider than the widest line. Modify the `paper-height` setting to fit the height of the tallest line.

`ly:one-line-breaking` *paper-book* [Function]
Put each score on a single line, and put each line on its own page. Modify the `paper-width` setting so that every page is wider than the widest line.

`ly:one-page-breaking` *paper-book* [Function]
Put each score on a single page. The `paper-height` settings are modified so each score fits on one page, and the height of the page matches the height of the full score.

`ly:optimal-breaking` *paper-book* [Function]
Optimally break (pages and lines) the `Paper_book` object *paper-book* to minimize badness for both vertical and horizontal spacing.

`ly:option-usage` *port internal* [Function]
Print `ly:set-option` usage. Optional *port* argument for the destination defaults to current output port. Specify *internal* to get doc for internal options.

`optional-material-bracket::positions` *grob* [Function]
Callback for `OptionalMaterialBracket` grobs.

`optionally-grouped-beat-structure->beat-structure` *structure* [Function]
If *structure* has groups defining submeasures, ungroup them.

`optionally-grouped-beat-structure->submeasure-structure` [Function]
structure
If the beats in *structure* are grouped, extract the submeasure structure from them.

`ly:otf->cff` *otf-file-name idx* [Function]
Convert the contents of an OTF file to a CFF file, returning it as a string. The optional *idx* argument is useful for OpenType/CFF collections (OTC) only; it specifies the font index within the OTC. The default value of *idx* is 0.

`ly:otf-font?` *font* [Function]
Is *font* an OpenType font?

`ly:otf-font-glyph-info` *font glyph* [Function]
Given the font metric *font* of an OpenType font, return the information about named glyph *glyph* (a string).

`ly:otf-font-table-data` *font tag* [Function]
Extract a table *tag* from *font*. Return empty string for non-existent *tag*.

`ly:otf-glyph-count` *font* [Function]
Return the number of glyphs in *font*.

`ly:otf-glyph-list` *font* [Function]
Return a list of glyph names for *font*.

`ly:output-def?` *x* [Function]
Is *x* a smob of class `Output_def`?

`ly:output-def-clone` *def* [Function]
Clone output definition *def*.

`ly:output-def-lookup` *def sym val* [Function]
Return the value of *sym* in output definition *def* (e.g., `\paper`). If no value is found, return *val* or `'()` if *val* is undefined.

`ly:output-def-parent` *output-def default-value* [Function]
Return the parent output definition of *output-def*, or *default-value* if *output-def* has no parent. *default-value* is optional, and defaults to `'()`.

`ly:output-def-scope` *def* [Function]
Return the variable scope inside *def*.

`ly:output-def-set-variable!` *def sym val* [Function]
Set an output definition *def* variable *sym* to *val*.

`ly:output-description` *output-def* [Function]
Return the description of translators in *output-def*.

`ly:output-file-name-for-input-file-name` *name* [Function]
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* [Function]
Return an alist of all context defs (matching *context-name* if given) in *output-def*.

`output-module?` *module* [Function]
Return `#t` if *module* belongs to an output module usually carrying context definitions (`\midi` or `\layout`).

`ly:outputter-close` *outputter* [Function]
Close port of *outputter*.

`ly:outputter-dump-stencil` *outputter stencil* [Function]
Dump stencil *expr* onto *outputter*.

`ly:outputter-dump-string` *outputter str* [Function]
Dump *str* onto *outputter*.

`ly:outputter-output-scheme` *outputter expr* [Function]
Output *expr* to the paper outputter.

`ly:outputter-port` *outputter* [Function]
Return output port for *outputter*.

`oval-stencil` *stencil thickness x-padding y-padding* [Function]
Add an oval around `stencil`, padded by the padding pair, producing a new stencil.

`override-head-style` *heads style* [Function]
Override style for *heads* to *style*.

`override-time-signature-setting` *time-signature setting* [Function]
Override the time signature settings for the context in *time-signature*, with the new setting alist *setting*.

`ly:page-marker?` *x* [Function]
Is *x* a smob of class `Page_marker`?

`ly:page-turn-breaking` *paper-book* [Function]
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* [Function]
Is *f* a Pango font?

`ly:pango-font-physical-fonts` *f* [Function]
Return alist of `(ps-name file-name font-index)` lists for Pango font *f*.

`pango-pf-file-name` *pango-pf* [Function]
Return the file name of the Pango physical font *pango-pf*.

`pango-pf-font-name` *pango-pf* [Function]
Return the font name of the Pango physical font *pango-pf*.

`pango-pf-fontindex` *pango-pf* [Function]
Return the font index of the Pango physical font *pango-pf*.

`ly:paper-book?` *x* [Function]
Is *x* a smob of class `Paper_book`?

`ly:paper-book-header` *pb* [Function]
Return the header definition (`\header`) in `Paper_book` object *pb*.

`ly:paper-book-pages` *pb* [Function]
Return pages in `Paper_book` object *pb*.

`ly:paper-book-paper` *pb* [Function]
Return the paper output definition (`\paper`) in `Paper_book` object *pb*.

`ly:paper-book-performances` *pb* [Function]
Return performances in `Paper_book` object *pb*.

`ly:paper-book-scopes` *pb* [Function]
Return scopes in `Paper_book` object *pb*.

`ly:paper-book-systems` *pb* [Function]
Return systems in `Paper_book` object *pb*.

`ly:paper-column::break-align-width` *col align-syms* [Function]
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` [Function]
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* [Function]
Return a list containing the fonts from output definition *def* (e.g., `\paper`).

`ly:paper-get-font` *def chain* [Function]
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* [Function]
Return the value of variable *sym* in output definition *def* as a double.

`ly:paper-outputscale` *def* [Function]
Return the `output-scale` for output definition *def*.

`ly:paper-score-paper-systems` *paper-score* [Function]
Return vector of `paper_system` objects from *paper-score*.

`ly:paper-system?` *obj* [Function]
Is *obj* a C++ `Prob` object of type `paper-system`?

`parenthesize-stencil` *stencil half-thickness width angularity padding* [Function]
Add parentheses around *stencil*, returning a new stencil.

`ly:parse-file` *name* [Function]
Parse a single `.ly` file. Upon failure, throw `ly-file-failed` key.

`ly:parse-init` *name* [Function]
Parse the init file *name*.

`ly:parse-string-expression` *parser-smob ly-code filename line* [Function]
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* [Function]
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!` [Function]
Return the list of objects that have been found alive but should have been dead, and clear that list.

`ly:parser-append-to-include-path` *path* [Function]
Append *path* to the current parser's include path.

`ly:parser-clear-error` *parser* [Function]
Clear error flag for *parser*, defaulting to current parser.

`ly:parser-clone` *closures location* [Function]
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!` *id val* [Function]
Bind *id* to *val* in current parser's module.

`ly:parser-define-once!` *id val* [Function]
If *id* is unbound, bind it to *val* in current parser's module.

`ly:parser-error` *msg input* [Function]
Display an error message and make current parser fail. Without a current parser, trigger an ordinary error.

`ly:parser-has-error?` *parser* [Function]
Does *parser* (defaulting to current parser) have an error flag?

`ly:parser-include-string` *ly-code* [Function]
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` *id rest* [Function]
Look up *id* in the current parser's module.

The *rest* arguments may contain the `#:default` keyword option with the value to return when the variable is not defined. When the `#:default` option is absent, `'()` is used.

`ly:parser-output-name` *parser* [Function]
Return the base name of the output file. If *parser* is left off, use currently active parser.

`ly:parser-parse-string` *parser-smob ly-code* [Function]
Parse the string *ly-code* with *parser-smob*. Upon failure, throw `ly-file-failed` key.

`ly:parser-set-note-names` *names* [Function]
Replace current note names in parser. *names* is an alist of symbols. This only has effect if the current mode is notes.

`percussion?` *instrument* [Function]
Return `#t` if the instrument should use MIDI channel 9.

`ly:perform-text-replacements` *props input-string* [Function]
A string transformer to perform text replacements using the `replacement-alist` from the property alist chain *props*.

`ly:performance-headers` *performance* [Function]
Return the list of headers with the innermost first.

`ly:performance-write` *performance filename name* [Function]
Write *performance* to *filename* storing *name* as the name of the performance in the file metadata.

`ly:pitch?` *x* [Function]
Is *x* a smob of class `Pitch`?

`ly:pitch<?` *p1 p2* [Function]
Is *p1* lexicographically smaller than *p2*?

`pitch->alteration` *pitch* [*language*] [Function]
Return the alteration of *pitch*.

Optional argument *language* sets the language used to display the pitch name (see file `define-note-names.scm` for available values); if this symbol is missing or set to `#f`, the current input language is used.

`pitch->name` *pitch* [*language*] [Function]
Return name of *pitch* without accidentals or octaves.

Optional argument *language* sets the language used to display the pitch name (see file `define-note-names.scm` for available values); if this symbol is missing or set to `#f`, the current input language is used.

`ly:pitch-alteration` *pp* [Function]
Extract the alteration from pitch *pp*.

`ly:pitch-diff` *pitch root* [Function]
Return pitch *delta* such that *root* transposed by *delta* equals *pitch*.

`ly:pitch-negate` *p* [Function]
Negate pitch *p*.

`ly:pitch-notename` *pp* [Function]
Extract the note name from pitch *pp*.

`ly:pitch-octave` *pp* [Function]
Extract the octave from pitch *pp*.

`ly:pitch-quartertones` *pp* [Function]
Calculate the number of quarter tones of pitch *pp* from middle C.

`ly:pitch-semitones` *pp* [Function]
Calculate the number of semitones of pitch *pp* from middle C.

`ly:pitch-steps` *p* [Function]
Number of steps counted from middle C of the pitch *p*.

`ly:pitch-tones` *pp* [Function]
Calculate the number of tones of pitch *pp* from middle C as a rational number.

`ly:pitch-transpose` *p delta* [Function]
Transpose pitch *p* by the amount *delta*, where *delta* is relative to middle C.

`ly:png->eps-dump` *file-name port r g b a* [Function]
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* [Function]
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* [Function]
Add *grob-element* to *grob*'s *sym* grob array.

`polar->rectangular` *radius angle-in-degrees* [Function]
Return polar coordinates (*radius*, *angle-in-degrees*) as rectangular coordinates `(x-length . y-length)`.

`ly:position-on-line?` *sg spos* [Function]
Return whether *spos* is on a line of the staff associated with the grob *sg* (even on an extender line).

`prepend-alist-chain` *key val chain* [Function]
Convenience to make a new alist chain from *chain* by prepending a binding of *key* to *val*. This is similar to `acons`, for alist chains (lists of alists).

`ly:prob?` *x* [Function]
Is *x* a smob of class `Prob`?

`ly:prob-immutable-properties` *prob* [Function]
Retrieve an alist of immutable properties.

`ly:prob-mutable-properties` *prob* [Function]
Retrieve an alist of mutable properties.

`ly:prob-property` *prob sym val* [Function]
Return the value for property *sym* of Prob object *prob*. If no value is found, return *val* or `'()` if *val* is not specified.

`ly:prob-property?` *obj sym* [Function]
Is boolean prop *sym* of *obj* set?

`ly:prob-set-property!` *obj sym value* [Function]
Set property *sym* of *obj* to *value*.

`ly:prob-type?` *obj type* [Function]
Is *obj* the specified prob type?

`ly:programming-error` *str rest* [Function]
A Scheme callable function to issue the internal warning *str*. The message is formatted with `format`; *rest* holds the formatting arguments (if any).

`ly:progress` *str rest* [Function]
A Scheme callable function to print progress *str*. The message is formatted with `format`; *rest* holds the formatting arguments (if any).

`ly:property-lookup-stats` *sym* [Function]
Return hash table with a property access corresponding to *sym*. Choices are `prob`, `grob`, and `context`.

`ly:pt` *num* [Function]
num printer points.

`ly:pure-call` *data grob start end rest* [Function]
Convert property *data* (unpure-pure container or procedure) to value in a pure context defined by *grob*, *start*, *end*, and possibly *rest* arguments.

`pure-chain-offset-callback` *grob start end prev-offset* [Function]
Sometimes, a chained offset callback is unpure and there is no way to write a pure function that estimates its behavior. In this case, we use a pure equivalent that will simply pass the previous calculated offset value.

`ratio->fret` *ratio* [Function]
Calculate a fret number given *ratio* for the harmonic.

`ratio->pitch` *ratio* [Function]
Calculate a pitch given *ratio* for the harmonic.

`read-lily-expression` *chr port* [Function]
Read a lilypond music expression enclosed within `#{` and `#}` from *port* and return the corresponding Scheme music expression. '$' and '#' introduce immediate and normal Scheme forms.

`recording-group-emulate` *music odef* [Function]
Interpret *music* according to *odef*, but store all events in a chronological list, similar to the `Recording_group_engraver` in LilyPond version 2.8 and earlier.

`ly:regex?` *x* [Function]
Is *x* a smob of class `Regex`?

`ly:regex-exec` *regex string* [Function]
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:

```
#(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* [Function]
Like `ly:regex-exec`, but return a list of non-overlapping matches instead of the first match only."

`ly:regex-match?` *x* [Function]
Is *x* a regular expression match object?

`ly:regex-match-positions` *match* [*index*] [Function]
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* [Function]
Retrieve the part of the target string before the regex match *m*.

`ly:regex-match-substring` *m* [*index*] [Function]
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* [Function]
Retrieve the part of the target string after the regex match *m*.

`ly:regex-quote` *string* [Function]
Escape special characters in *string*, forming a regular expression pattern that matches exactly *string*.

Example:

```
(ly:regex-quote "$2")
⇒ "\\$2"
```

`ly:regex-replace` *regex string replacements* [Function]
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:

```
#(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:

```
#(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* [Function]
Split *str* into non-overlapping occurrences of the regex *regex*, returning a list of the substrings.

`ly:register-stencil-expression` *symbol* [Function]
Add *symbol* as head of a stencil expression.

`ly:register-translator` *creator name description* [Function]
Register a translator *creator* (usually a descriptive alist or a function/closure returning one when given a context argument) with the given symbol *name* and the given *description* alist.

`ly:relative-group-extent` *elements common axis* [Function]
Determine the extent of *elements* relative to *common* in the *axis* direction.

`remove-from-tag-group` *tag-group tags* [Function]
Remove the given *tags* from the existing *tag-group* symbol list.

Returns `#f` if successful, and an error message if the *tag-group* does not exist.

`remove-grace-property` *context-name grob sym* [Function]
Remove all *sym* for *grob* in *context-name*.

`remove-whitespace` *strg* [Function]
Remove characters satisfying `char-whitespace?` from string *strg*.

`ly:rename-file` *oldname newname* [Function]
Rename *oldname* to *newname*. In contrast to Guile's `rename-file` function, this replaces the destination if it already exists. On Windows, fall back to copying the file contents if *newname* cannot be deleted.

`ly:reset-all-fonts` [Function]
Forget all about previously loaded fonts.

`ly:reset-options` *alist* [Function]
Reset all program options to the values in *alist*.

`reset-tag-group` *tag-group* [Function]
Remove the tag group definition for the given *tag-group* symbol list.

Returns `#f` if successful, and an error message if the given tag group could not be found.

`reset-tag-groups` [Function]
Reset the tag groups to the default internal tag groups.

`retrieve-glyph-flag` *flag-style dir dir-modifier grob* [Function]
Load the correct flag glyph from the music font.

This is an auxiliary function for `create-glyph-flag`.

`retrograde-music` *music* [Function]
Return *music* in retrograde (reversed) order.

`revert-fontSize` *func-name mag* [Function]
Used by `\magnifyMusic` and `\magnifyStaff`. Calculate the previous `fontSize` value (before scaling) by factoring out the magnification factor *mag* (if *func-name* is `'magnifyMusic`), or by factoring out the context property `magnifyStaffValue` (if *func-name* is `'magnifyStaff`). Revert the `fontSize` in the appropriate context accordingly.

With `\magnifyMusic`, the scaling is reverted after the music block it operates on. `\magnifyStaff` does not operate on a music block, so the scaling from a previous call (if there is one) is reverted before the new scaling takes effect.

`revert-head-style` *heads* [Function]
Revert style for *heads*.

`revert-props` *func-name mag props* [Function]
Used by `\magnifyMusic` and `\magnifyStaff`. Revert each prop in *props* in the appropriate context. *func-name* is either `'magnifyMusic` or `'magnifyStaff`. The *props* list is formatted like:

```
'((Stem thickness)
  (Slur line-thickness)
  ...)
```

`ly:round-filled-box` *xext yext blot* [Function]
Make a `Stencil` object that prints a black box of dimensions *xext*, *yext* and roundness *blot*.

`ly:round-polygon` *points blot extroversion filled* [Function]
Make a `Stencil` object that prints a polygon with corners at the points defined by *points* (a list of coordinate pairs) and roundness *blot*. Optional numeric argument *extroversion* shifts the outline outward, with the default of 0 keeping the middle of the line just on the polygon. If optional Boolean argument *filled* is set to `#t` (which is the default), fill the polygon.

`rounded-box-stencil` *stencil thickness padding blot* [Function]
Add a rounded box around *stencil*, producing a new stencil.

`ly:run-translator` *mus output-def* [Function]
Process *mus* according to *output-def*. An interpretation context is set up, and *mus* is interpreted with it. The context is returned in its final state.

`sane-time-signature?` *x* [Function]
Is *x* a supported, semantically valid time signature in canonical form?

See the `\time` command for a description of canonical form.

`scale-beam-thickness` *mag* [Function]
Used by `\magnifyMusic`. Scaling `Beam.beam-thickness` exactly to the *mag* value will not work. This uses two reference values for `beam-thickness` to determine an acceptable value when scaling, then does the equivalent of a `\temporary \override` with the new value.

`scale-fontSize` *func-name mag* [Function]
Used by `\magnifyMusic` and `\magnifyStaff`. Look up the current `fontSize` in the appropriate context and scale it by the magnification factor *mag*. *func-name* is either `'magnifyMusic` or `'magnifyStaff`.

`scale-layout` *paper scale* [Function]
Return a clone of *paper*, scaled by the given scale factor.

`scale-props` *func-name mag allowed-to-shrink? props* [Function]
Used by `\magnifyMusic` and `\magnifyStaff`. For each prop in *props*, find the current value of the requested prop, scale it by the magnification factor *mag*, and do the equivalent of a `\temporary \override` with the new value in the appropriate context. If *allowed-to-shrink?* is `#f`, don't let the new value be less than the current value. *func-name* is either `'magnifyMusic` or `'magnifyStaff`. The *props* list is formatted like:

```
'((Stem thickness)
  (Slur line-thickness)
  ...)
```

`ly:score?` *x* [Function]
Is *x* a smob of class `Score`?

`ly:score-add-output-def!` *score def* [Function]
Add an output definition *def* to *score*.

`ly:score-embedded-format` *score layout* [Function]
Run *score* through *layout* (an output definition) scaled to correct `output-scale` already, returning a list of layout lines.

`ly:score-error?` *score* [Function]
Was there an error in the score?

`ly:score-header` *score* [Function]
Return score header.

`ly:score-music` *score* [Function]
Return score music.

`ly:score-output-defs` *score* [Function]
All output definitions in a score.

`ly:score-set-header!` *score module* [Function]
Set the score header.

`scorify-music` *music* [Function]
Preprocess *music* and encapsulate it into a score smob.

Among other things, preprocessing replaces chord repetitions via 'q' with the correct actual chords.

`ly:script-interface::calc-direction` *grob* [Function]
Usually the `'direction` of an articulation is set in `default-script-alist`. If the `'direction` is not specified there and not specified by user settings, this procedure steps in.

In absence of `'direction` the direction for vertically placed scripts is calculated taking its `'direction-source`, usually `Stem`, and its `'side-relative-direction`, falling back to value `1`, into account. For horizontally placed scripts we simply provide `LEFT` as a fallback value.

As a last resort `CENTER` is returned.

`ly:script-interface::print` *grob* [Function]
The `stencil` of a script grob.

`seconds->moment` *s context* [Function]
Return a moment equivalent to *s* seconds at the current tempo.

`select-head-glyph` *style log* [Function]
Select a note head glyph string.

The constructed name is based on note head style *style* and the duration log *log*.

`self-alignment-interface::self-aligned-on-breakable` *grob* [Function]
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* [*omit-root*] [Function]
Transform sequential music *seq* to chord exceptions.

seq is music that contains a sequence of chords with attached markup having the form

```
<pitch1 pitch2 ... >...-\markup { markup }
```

for example, `<c e g b d'>-\markup \super "maj9"`.

Each chord gets transformed to a chord exception, which is a two-element list: its first element is a list representing the pitches *pitch1*, *pitch2*, etc., in a normalized form; the second element holds a procedure that generates *markup*.

If optional argument *omit-root* is set and not equal to `#f`, *pitch1* (i.e., the root of the chord) is omitted while constructing the chord exception.

The function returns a list of all chord exceptions given in *seq*.

`set-accidental-style` *style rest . . .* [Function]
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 ...* [Function]
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* [Function]
Set the global default scale. This determines the tuning of pitches with no accidentals or key signatures. The first pitch is C. Alterations are calculated relative to this scale. The number of pitches in this scale determines the number of scale steps that make up an octave. Usually the 7-note major scale.

`set-global-staff-size` *sz* [Function]
Set the default staff size, where *sz* is thought to be in points.

`ly:set-grob-creation-callback` *cb* [Function]
Specify a procedure that gets called every time a new grob is created. The callback receives as arguments the grob that was created, the name of the C++ source file that caused the grob to be created, and the corresponding line number in the C++ source file. Call with `#f` as argument to unset the callback.

`ly:set-grob-modification-callback` *cb* [Function]
Specify a procedure that gets called every time LilyPond modifies a grob property. The callback receives as arguments the grob that is being modified, the name of the C++ file in which the modification was requested, the line number in the C++ file in which the modification was requested, the name of the function in which the modification was requested, the property to be changed, and the new value for the property. Call with `#f` as argument to unset the callback.

`ly:set-middle-C!` *context* [Function]
Set the `middleCPosition` variable in *context* based on the variables `middleCClefPosition` and `middleCOffset`.

`set-mus-properties!` *m alist* [Function]
Set all of *alist* as properties of *m*.

`ly:set-option` *var val* [Function]
Set program option *var* to value *val*.

See also function `ly:add-option`.

`ly:set-origin!` *m origin* [Function]
Set the origin given in *origin* to *m*. *m* is typically a music expression or a list of music. List structures are searched recursively, but recursion stops at the changed music expressions themselves.

origin is generally of type `ly:input-location?`, defaulting to `(*location*)`. Other valid values for `origin` are a music expression which is then used as the source of location information, or `#f` or `'()` in which case no action is performed. The return value is *m* itself.

`set-output-property` *grob-name symbol val* [Function]
Usage example: `\applyoutput #(set-output-property 'Clef 'extra-offset '(0 . 1))`

`set-paper-size` *name rest ...* [Function]
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* [Function]
Specify a procedure that gets called whenever LilyPond calculates a callback function and caches the result. The callback receives as arguments the grob whose property it is, the name of the property, the name of the callback that calculated the property, and the new (cached) value of the property. Call with `#f` as argument to unset the callback.

`ly:set-rand-seed` *seed* [Function]
Seed the internal pseudo-random generator with the specified value.

`shift-one-duration-log` *music shift dot* [Function]
Add *shift* to `duration-log` of `'duration` in *music* and optionally *dot* to any note encountered. The number of dots in the shifted music may not be less than zero.

`shift-right-at-line-begin` *g* [Function]
Shift an item to the right, but only at the start of the line.

`shift-semitone->pitch` *key semitone->pitch* [Function]
Given a function *semitone->pitch* converting a semitone number into a note value for a lookup table created in relation to C, returns a corresponding function in relation to *key*. The note values returned by this function differ only enharmonically from the original *semitone->pitch* function.

`skip->rest` *mus* [Function]
Replace *mus* by `RestEvent` of the same duration if it is a `SkipEvent`. Useful for extracting parts from crowded scores.

`skip-of-length` *mus* [Function]
Create a skip of exactly the same length as *mus*.

`skip-of-moment-span` *start-moment end-moment* [Function]
Make skip music fitting between *start-moment* and *end-moment*. The grace part of *end-moment* matters only if *start-moment* and *end-mom* have the same main part.

`ly:skyline?` *x* [Function]
Is *x* a smob of class `Skyline`?

`ly:skyline->points` *skyline horizon-axis* [Function]
Return a list of points from the given skyline, if viewed with *horizon-axis* as 'horizon axis'. Joining the points with a line draws the outline of the skyline.

`ly:skyline-distance` *skyline other-skyline horizon-padding* [Function]
Compute the distance between the two skylines, padding by *horizon-padding* if provided.

`ly:skyline-empty?` *sky* [Function]
Return whether skyline *sky* is empty.

`ly:skyline-height` *skyline x* [Function]
Return the height of *skyline* at point *x*.

`ly:skyline-max-height` *skyline* [Function]
Return the maximum height found in *skyline*.

`ly:skyline-max-height-position` *skyline* [Function]
Return the position at which *skyline* reaches its maximum height.

`ly:skyline-merge` *skyline1 skyline2* [Function]
Merge the two given skylines.

`ly:skyline-pad` *skyline horizon-padding* [Function]
Return a version of *skyline* padded by *horizon-padding* along the horizon.

`ly:skyline-touching-point` *skyline other-skyline horizon-padding* [Function]
Get the point where *skyline* and *other-skyline* (having opposite directions) reach their minimum distance. If *horizon-padding* is provided, one skyline is padded with it first.

`ly:skylines-for-stencil` *stencil axis* [Function]
Return a pair of skylines representing the outline of *stencil*. *axis* is the 'horizon axis' (i.e., this function gives skylines suitable for the `vertical-skylines` property if *axis* is `X`, and for `horizontal-skylines` if *axis* is `Y`).

`ly:smob-protects` [Function]
Return LilyPond's internal smob protection list.

`ly:solve-spring-rod-problem` *springs rods length ragged* [Function]
Solve a spring and rod problem for *count* objects that are connected by *count*-1 *springs*, and an arbitrary number of *rods*. *count* is implicitly given by *springs* and *rods*. The *springs* argument has the format `(ideal, inverse_hook)` and *rods* is of the form `(idx1, idx2, distance)`.

length is a number, *ragged* a boolean.

The function returns a list containing the force (positive for stretching, negative for compressing and `#f` for non-satisfied constraints) followed by *spring-count*+1 positions of the objects.

`ly:source-file?` *x* [Function]
Is *x* a smob of class `Source_file`?

`ly:source-files` *parser-smob* [Function]
Return a list of input files that have been opened up to here, including the files that have been closed already. A parser, *parser-smob*, may optionally be specified.

`ly:span-bar::before-line-breaking` *grob* [Function]
A dummy callback that kills the `Grob` *grob* if it contains no elements.

`ly:span-bar::calc-anchor` *grob* [Function]
Calculate the anchor position of the `SpanBar`. The anchor is used for the correct placement of bar numbers, etc.

`ly:span-bar::calc-glyph-name` *grob* [Function]
Return the `'glyph-name` of the corresponding `BarLine` grob. The corresponding `SpanBar` glyph is computed within `span-bar::compound-bar-line`.

`span-bar::compound-bar-line` *grob bar-glyph extent* [Function]
Build the stencil of the span bar.

`ly:span-bar::print` *grob* [Function]
The print routine for span bars.

`ly:span-bar::width` *grob* [Function]
Compute the width of the `SpanBar` stencil.

`Span_stem_engraver` *ctx* [Function]
Connect cross-staff stems to the stems above in the system.

`ly:spanner?` *g* [Function]
Is *g* a spanner object?

`ly:spanner-bound` *spanner dir def* [Function]
Get one of the bounds of *spanner*. *dir* is `-1` for left, and `1` for right. If the spanner does not (yet) have a bound for this direction, return *def*, or `'()` if *def* is not specified.

`ly:spanner-broken-into` *spanner* [Function]
Return broken-into list for *spanner*.

`ly:spanner-broken-neighbor` *spanner dir* [Function]
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* [Function]
Set grob *item* as bound in direction *dir* for *spanner*.

`ly:spawn` *command rest* [Function]
Simple Scheme interface to the GLib function `g_spawn_sync`. If an error occurs, format it with `format` and *rest*.

`split-list-by-group-lengths` *lst groups* [Function]
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* [Function]
Split *lst* at each element that satisfies *pred*, and return the parts (with the separators removed) as a list of lists. Example:

```
(split-list-by-separator '(a 0 b c 1 d) number?)
   ⇒ ((a) (b c) (d))
```

`ly:spring?` *x* [Function]
Is *x* a smob of class `Spring`?

`ly:spring-set-inverse-compress-strength!` *spring strength* [Function]
Set the inverse compress *strength* of *spring*.

`ly:spring-set-inverse-stretch-strength!` *spring strength* [Function]
Set the inverse stretch *strength* of *spring*.

`stack-lines` *dir padding baseline stils* [Function]
Stack stencils vertically with a baseline skip.

`stack-stencil-line` *space stencils* [Function]
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* [Function]
Stack stencils *stils* in direction *axis*, *dir*, using *padding*.

`stack-stencils-padding-list` *axis dir paddings stils* [Function]
Stack stencils *stils* in direction *axis*, *dir*, using a list of *paddings*.

`staff-ellipsis::print` *grob* [Function]
Callback for `StaffEllipsis` grob, which is used with `skipTypesetting`.

`staff-ellipsis::pure-height` *grob beg end* [Function]
Callback for `StaffEllipsis` grob, which is used with `skipTypesetting`.

`ly:staff-symbol-line-thickness` *grob* [Function]
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* [Function]
Return the radius of the staff associated with *grob*.

`ly:staff-symbol-staff-space` *grob* [Function]
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* [Function]
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:stem::extremal-heads` [Function]
Return a pair containing the lowest and highest heads on this stem.

If the stem has only one head, both elements of the pair refer to it. If the stem has no heads, the result is `'(() . ())`.

`ly:stencil?` *x* [Function]
Is *x* a smob of class `Stencil`?

`ly:stencil-add` *args* [Function]
Combine stencils. Takes any number of arguments.

`ly:stencil-aligned-to` *stil axis dir* [Function]
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* [Function]
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`.

If either of the stencils is spacing (i.e., the result of `\\hspace` markup and similar commands), *padding* does not apply.

`ly:stencil-empty?` *stil axis* [Function]
Return whether *stil* is empty. If an optional *axis* is supplied, the emptiness check is restricted to that axis.

`ly:stencil-expr` *stil* [Function]
Return the expression of stencil *stil*.

`ly:stencil-extent` *stil axis* [Function]
Return a pair of numbers signifying the extent of stencil *stil* in *axis* direction (`0` or `1` for x and y axis, respectively).

`ly:stencil-outline` *stil outline* [Function]
Return a stencil with the stencil expression (inking) of stencil *stil* but with outline and dimensions from stencil *outline*.

`stencil-pad-around` *amount stencil* [Function]
Add a padding of *amount* around *stencil*, returning a new stencil.

`ly:stencil-rotate` *stil angle x y* [Function]
Return a stencil *stil* rotated by *angle* degrees around the relative offset (*x*, *y*). E.g., an offset of (-1, 1) rotates the stencil around the left upper corner.

`ly:stencil-rotate-absolute` *stil angle x y* [Function]
Return a stencil *stil* rotated by *angle* degrees around point (*x*, *y*), given in absolute coordinates.

`ly:stencil-scale` *stil x y* [Function]
Scale stencil *stil* using the horizontal and vertical scaling factors *x* and optional *y* (defaulting to *x*). Negative values flip or mirror *stil* without changing its origin; this may result in collisions unless it is repositioned.

`stencil-squash-extent` *stencil axis* [Function]
Set the extent of *stencil* in the dimension *axis* to zero.

`ly:stencil-stack` *first axis direction second padding mindist* [Function]
Construct a stencil by stacking *second* next to *first*.

axis can be `0` (x axis) or `1` (y axis). *direction* can be `-1` (left or down) or `1` (right or up). The stencils are juxtaposed with *padding* as extra space. *first* and *second* may also be `'()` or `#f`. As opposed to `ly:stencil-combine-at-edge`, metrics are suited for successively accumulating lines of stencils. Also, *second* stencil is drawn last.

If *mindist* is specified, reference points are placed apart at least by this distance. If either of the stencils is spacing (i.e., the result of `\\hspace` markup and similar commands), *padding* and *mindist* do not apply.

`ly:stencil-translate` *stil offset* [Function]
Return a copy of stencil *stil* but translated by *offset* (a pair of numbers).

`ly:stencil-translate-axis` *stil amount axis* [Function]
Return a copy of stencil *stil* but translated by *amount* in *axis* direction.

`stencil-true-extent` *stencil axis* [Function]
Return the extent of the actual printed ink of *stencil* on *axis*.

`stencil-whiteout` *stil* [*style* [*thickness* [*line-thickness* [*color*]]]] [Function]
White-out stencil *stil* (i.e., add a white background around it).

If set, optional argument *style* determines the shape of the white background: value `'outline` makes the function use `stencil-whiteout-outline` to produce the white background, value `'rounded-box` applies `stencil-whiteout-box` to produce a white background with rounded corners. If other values are given (e.g., `'box`) or when unspecified, `stencil-whiteout-box` is used to produce a white background with square corners.

If optional argument *thickness* is specified it determines how far, as a multiple of *line-thickness* (which is an optional argument, too, defaulting to value 0.1), the white background extends past the extents of *stil*. If *thickness* is not specified, an appropriate default is chosen based on *style*.

Optional argument *color* sets the color of the white-out, defaulting to white.

`stencil-whiteout-box` *stil* [*thickness* [*blot* [*color*]]] [Function]

White-out stencil *stil* by printing it on top of a white rectangle.

By default, the white background rectangle encloses *stil* without any borders; this can be changed by setting optional argument *thickness* (defaulting to value zero). Optional argument *blot* gives the blot diameter for rounding the corners of the background rectangle (default value is zero, making sharp corners). Optional argument *color* changes the background color (defaulting to white).

`stencil-whiteout-outline` *stil* [*thickness* [*color* [*angle-increments* [*radial-increments*]]]] [Function]

White-out stencil *stil* by surrounding its outline with white.

This function works by creating a series of white stencils radially offset from the original stencil with angles from 0° to 360°.

Optional argument *thickness* (default value 0.3) specifies how big the white outline is.

The number of angle increments can be controlled with optional argument *angle-increments*, defaulting to value 16 (corresponding to 22.5°). The number of radius increments (from zero to *thickness*) can be controlled with optional argument *radial-increments*, defaulting to value 1. Thus *radial-increments* specifies how many copies of the white stencil we make on our way out to *thickness*, and *angle-increments* how many copies of the white stencil we make between 0° and 360°. In total, *radial-increments***angle-increments* copies are drawn.

Optional argument *color* changes the white-out color (defaulting to white).

`stencil-with-color` *stencil color* [Function]

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* [Function]

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* [Function]

Is *obj* a `Stream_event` object?

`string->string-list` *str* [Function]

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* [Function]

Encode all characters in string *str* with hexadecimal percent escape sequences, with the following exceptions: characters '`-./_`' and characters in ranges `0-9`, `A-Z`, and `a-z`.

`ly:string-substitute` *a b s* [Function]
Replace string *a* by string *b* in string *s*.

`style-note-heads` *heads style music* [Function]
Set *style* for all *heads* in *music*. Works both inside of and outside of chord construct.

`suggest-convert-ly-message` *version-seen* [Function]
Internally used when the file has an error, to suggest usage of `convert-ly` if the `\version` statement is considered outdated compared to the LilyPond version that is running.

`symbol-concatenate` *names ...* [Function]
Like `string-concatenate`, but for symbols.

`ly:system-font-load` *name* [Function]
Load the OpenType system font *`name`*`.otf`. Fonts loaded with this command must contain 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.

`tab-note-head::handle-ties` *grob* [Function]
Handle tab note heads ending a `Tie`, deal with `RepeatTie`.

If a `Slur` or `Glissando` starts at a tie-ending `TabNoteHead` always print the `TabNoteHead` parenthesized.

If a tie-ending `TabNoteHead` occurs at the beginning of a line print it parenthesized unless sub-properties `note-head-visible` and `parenthesize` of `details.tied-properties` are set `#f`, which can be done manually or using `hideSplitTiedTabNotes`.

A `TabNoteHead` with `\repeatTie` is printed parenthesized as well, the same holds if `\repeatTie` is applied to a chord. This is useful for seconda volta blocks. This behavior can be switched off with `hideSplitTiedTabNotes`.

`tab-note-head::print` *grob* [Function]
Print a tab note head.

`tag-group-defined?` *tag-group* [Function]
Test if given *tag-group* is defined.

Return `#t` if so and `#f` otherwise.

`tag-group-get` *tag* [Function]
Return the tag group (as a list of symbols) that the given *tag* symbol belongs to, `#f` if none.

`tags-keep-predicate` *tags* [Function]
Return a predicate that returns `#f` for any music that is to be removed by `\keepWithTag` on the given symbol or list of symbols *tags*.

`tags-remove-predicate` *tags* [Function]
Return a predicate that returns `#f` for any music that is to be removed by `\removeWithTag` on the given symbol or list of symbols *tags*.

`teaching-accidental-rule` *context pitch barnum* [Function]
An accidental rule that typesets a cautionary accidental if it is included in the key signature *and* does not directly follow a note on the same staff line.

`ly:text-interface::interpret-markup` [Function]
Convert a text markup into a stencil. *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`.

`time-signature?` *x* [Function]
Is *x* syntactically a time signature in canonical form?

When defining a music function that requires a canonical time signature, use this predicate in the function signature, then validate the value in the function body.

A time signature is one fraction or a list of two or more fractions (representing concatenation).

A fraction is a pair, (*numerator* . *denominator*), where the denominator is always a number. The numerator is one term or a list of two or more terms, where each term is either a number or another fraction. A list represents concatenation.

`ly:time-signature::calc-fraction` *grob* [Function]
Compatibility callback for the deprecated `fraction` property.

Returns the value of `time-signature` reduced to a fraction.

`ly:time-signature::print` *grob* [Function]
Print routine for time signatures.

`ly:time-signature::print-x` *grob* [Function]
Print routine for an X-shaped sign indicating no time signature.

`time-signature->fraction` *time-sig* [Function]
Reduce canonical time signature *time-sig* to a single, simple fraction (or #f).

`ly:time-tracer-include-and-remove-file` *file-name* [Function]
Incorporate records from file *file-name* into the current trace. If successful, remove *file-name*. This supports aggregating completed traces from child processes into the parent's trace.

`ly:time-tracer-restart` *name* [Function]
Reinitialize the global tracer in a child process to avoid interfering with the parent's trace. *name* is the name given to the top-level duration slice in the new trace.

`ly:time-tracer-set-file` *file-name* [Function]
Direct time-trace output to file *file-name*. If *file-name* is `#f`, disable tracing.

`ly:time-tracer-stop` [Function]
Finalize the global tracer.

`to-staff-space` *size* [*unit*] [Function]
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)
```

`toe-heel-subst-stencil` *grob left right* [Function]
Construct a stencil for a toe-heel substitution.

`ly:transform?` *x* [Function]
Is *x* a smob of class `Transform`?

`ly:transform->list` *transform* [Function]
Convert a transform matrix to a list of six values. Values are *xx*, *yx*, *xy*, *yy*, *x0*, *y0*.

`ly:translate-cpp-warning-scheme` *str* [Function]
Translate a string in C++ `printf` format and modify it to use it for Scheme formatting.

`ly:translator?` *x* [Function]
Is *x* a smob of class `Translator`?

`ly:translator-context` *trans* [Function]
Return the context of the translator object *trans*.

`ly:translator-description` *creator* [Function]
Return an alist of properties of translator definition *creator*.

`ly:translator-group?` *x* [Function]
Is *x* a smob of class `Translator_group`?

`ly:translator-name` *creator* [Function]
Return the type name of the translator definition *creator*. The name is a symbol.

`ly:transpose-key-alist` *l pit* [Function]
Make a new key alist of *l* transposed by pitch *pit*.

`tsig-abbr-expand` *abbr* [Function]
Convert abbreviated time signature *abbr* to canonical form.

This change is purely syntactic and does not check any values. Return `#f` if *abbr* is not syntactically valid.

See the `\timeAbbrev` command for a description of abbreviated form. See the `\time` command for a description of canonical form.

Example:

```
(tsig-abbr-expand '((2 3 8) (2 4)))
⇒ '(((2 3) . 8) (2 . 4))
```

`ly:ttf->pfa` *ttf-file-name idx* [Function]
Convert the contents of a TrueType font file to PostScript Type 42 font, returning it as a string. The optional *idx* argument is useful for TrueType collections (TTC) only; it specifies the font index within the TTC. The default value of *idx* is 0.

`ly:ttf-ps-name` *ttf-file-name idx* [Function]
Extract the PostScript name from a TrueType font. The optional *idx* argument is useful for TrueType collections (TTC) only; it specifies the font index within the TTC. The default value of *idx* is 0.

`ly:tuplet-description?` *x* [Function]
Is *x* a smob of class `Tuplet_description`?

`unbroken-or-first-broken-spanner?` *spanner* [Function]
Is *spanner* either unbroken or the first of its broken siblings?

`unbroken-or-last-broken-spanner?` *spanner* [Function]
Is *spanner* either unbroken or the last of its broken siblings?

`unbroken-spanner?` *spanner* [Function]
Is *spanner* unbroken? A spanner has to be broken if it spans more than one system, or if one of its bounds is on the limit of the system. This function returns `#f` on the clones, but `#t` on the originals.

`unfold-repeats` *types music* [Function]
Replace repeats of the types given by *types* with unfolded repeats. If *types* is an empty list, `repeated-music` is taken, unfolding all.

`unfold-repeats-fully` *music* [Function]
Unfold repeats and expand the resulting `unfolded-repeated-music`.

`uniq-list` *lst* [Function]
Remove doublets from list *lst* (i.e., make its elements unique), assuming that it is sorted. Uses `equal?` for comparisons.

`uniqued-alist` *alist* [*hash-func* [*assoc-func*]] [Function]
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* [Function]
Given a context and a duration, return `1` if the duration is longer than the `measureLength` in that context, and `#f` otherwise. This supports historic use of `Completion_heads_engraver` to split `c1*3` into three whole notes.

`ly:unpure-call` *data grob rest* [Function]
Convert property *data* (unpure-pure container or procedure) to value in an unpure context defined by *grob* and possibly *rest* arguments.

`ly:unpure-pure-container?` *x* [Function]
Is *x* a smob of class `Unpure_pure_container`?

`ly:unpure-pure-container-pure-part` *pc* [Function]
Return the pure part of *pc*.

`ly:unpure-pure-container-unpure-part` *pc* [Function]
Return the unpure part of *pc*.

`unspecified-music?` *mus* [Function]
Recognize 'unspecified' music by its `void` property. Music functions and event functions return such music by default.

`ly:usage` [Function]
Print usage message.

`value-for-spanner-piece` *property args* [Function]
Associate a piece of broken spanner *grob* with an element of list *arg*.

`ly:verbose-output?` [Function]
Was verbose output requested, i.e., is the log level at least `DEBUG`?

`ly:version` [Function]
Return the current LilyPond version as a list, e.g., `(1 3 127 uu1)`.

`ly:version?` *op ver* [Function]
Use operator *op* to compare the currently executed LilyPond version with a given version *ver*, which is passed as a list of numbers.

`voicify-music` *m* [*id*] [Function]
Recursively split chords that are separated with \\. Optional *id* can be a list of context ids to use. If numeric, they also indicate a voice type override. If *id* is just a single number, that's where numbering starts.

`volta-bracket::calc-hook-visibility` *bar-glyph* [Function]
Determine the visibility of the volta bracket end hook, returning `#t` if *no* hook should be drawn.

`ly:volta-bracket::calc-shorten-pair` *grob* [Function]
Calculate the `shorten-pair` values for an ideal placement of the volta brackets relative to the bar lines.

`volta-spec-music` *number-list music* [Function]
Add \volta *number-list* to *music*.

`ly:warning` *str rest* [Function]
A Scheme callable function to issue the warning *str*. The message is formatted with `format`; *rest* holds the formatting arguments (if any).

`ly:warning-located` *location str rest* [Function]
A Scheme callable function to issue the warning *str* at the specified location in an input file. The message is formatted with `format`; *rest* holds the formatting arguments (if any).

`ly:wide-char->utf-8` *wc* [Function]
Encode the Unicode codepoint *wc*, an integer, as UTF-8.

`write-me` *message x* [Function]
Return *x*. Display *message* and write *x*. Handy for debugging, possibly turned off.

Appendix A Indices

A.1 Function index

A

accidental->text-markup 895
add-bar-glyph-print-procedure 895
add-grace-property 895
add-new-clef 895
add-simple-time-signature-style 896
add-stroke-glyph 896
add-stroke-straight 896
add-to-tag-group 896
alist->hash-table 896
alist-keys 896
allow-volta-hook 896
alterations-in-key 897
angle-0-2pi 897
angle-0-360 897
apply-tag-operating-markup 897
approximate-pitch-note-head::
calc-direction 897
array-copy/subarray! 897
arrow-stencil 897
arrow-stencil-maker 897
ascend-to-context 897
assert 898
assoc-get 898
at-bar-line-substitute-caesura-type 898

B

bar-line::calc-break-visibility 898
bar-line::calc-glyph-name 898
bar-line::calc-glyph-name-for-direction 898
bar-line::compound-bar-line 898
bar-line::draw-filled-box 898
bar-line::widen-bar-extent-on-span 898
beam-exceptions 899
beat-base 899
beat-structure 899
bend-spanner::print 899
bend::arrow-head-stencil 899
bend::calc-bend-x-begin 899
bend::calc-bend-x-end 899
bend::target-cautionary 899
bend::text-string 899
bit-list->byte-list 900
bit-list->int 900
book-first-page 900
box-grob-stencil 900
box-stencil 900
bracketify-stencil 901
break-alignable-interface::
self-alignment-of-anchor 901
break-alignable-interface::
self-alignment-opposite-of-anchor 901
break-alignment-list 901
byte-list->bit-list 901

C

caesura-script-interface::
before-line-breaking 901
caesura-to-bar-line-or-divisio 901
caesura-to-divisio 901
calc-harmonic-pitch 901
calc-measure-length 901
calc-pattern-element 901
calc-submeasure-structure 902
centered-spanner-interface::calc-x-offset .. 902
centered-stencil 902
chain-assoc-get 902
change-pitches 902
check-context-path 902
check-grob-path 902
check-music-path 903
chord-name:german-lowercase-name-markup 903
chord-name:german-markup 903
chord-name:italian-markup 903
chord-name:markup 903
chord-name:name-markup 903
circle-stencil 903
clef-modifier::print 904
clef-transposition-markup 904
closest-staff-line 904
collect-book-music-for-book 904
collect-bookpart-for-book 904
collect-music-aux 904
collect-music-for-book 904
comparator-from-key 904
construct-chord-elements 904
context-spec-music 906
copy-repeat-chord 906
count-list 906
create-glyph-flag 906
cross-staff-connect 906
cue-substitute 906
cyclic-base-value 906

D

default-flag 907
define-bar-line 907
define-deprecated-property 907
define-event-class 907
define-event-function 907
define-fonts 907
define-markup-command 907
define-markup-list-command 908
define-music-function 908
define-scheme-function 909
define-syntax-function 909
define-tag-group 909
define-void-function 909
degrees->radians 909
descend-to-context 909
determine-split-list 909

determine-string-fret-finger 909
dir-basename 910
direction-scaled 910
display-lily-music 910
display-music 910
display-scheme-music 910
dodecaphonic-no-repeat-rule 910
duration-dot-factor 911
duration-line::calc 911
duration-line::print 911
duration-log-factor 911
duration-visual 911
duration-visual-length 911
dynamic-text-spanner::before-line-breaking . 911

E

elbowed-hairpin 912
ellipse-stencil 912
end-broken-spanner? 912
ensure-list 912
eval-carefully 913
event-chord-notes 913
event-chord-pitches 913
event-chord-reduce 913
event-chord-wrap! 913
event-has-articulation? 913
expand-repeat-chords! 913
expand-repeat-notes! 913
extract-beam-exceptions 914
extract-music 914
extract-named-music 914
extract-typed-music 914

F

figured-bass-continuation::print 914
fill-integer-interval 914
find-named-props 914
find-pitch-entry 914
finger-glide::print 915
first-assoc 915
first-broken-spanner? 915
first-member 915
flat-flag 915
flat-zip-longest 915
flatten-list 915
flip-stencil 915
fold-some-music 915
fold-values 915
font-name-split 916
for-some-music 916
format-segno-mark-considering-bar-lines 917
fret->pitch 917
fret-parse-terse-definition-string 917
function-chain 917

G

generate-crop-stencil 917
generate-preview-stencil 917
get-bound-note-heads 917
get-chord-shape 917
get-postscript-bbox 918
get-tweakable-music 918
glyph-flag 918
grob-transformer 921
grob::all-objects 918
grob::compose-function 918
grob::directional-value 918
grob::display-objects 918
grob::inherit-parent-property 919
grob::name 919
grob::offset-function 919
grob::relay-directional-property 919
grob::relay-other-property 919
grob::rhythmic-location 919
grob::unpure-Y-extent-from-stencil 919
grob::when 919
group-into-ranges 922

H

headers-property-alist-chain 922
hook-stencil 922
horizontal-script::calc-staff-position 922
horizontal-script::extra-spacing-height 922

I

index-map 922
int->bit-list 923
interpret-markup 923
interval-center 923
interval-index 923
interval-length 923
invalidate-alterations 923
item::extra-spacing-height-including-staff . 924

L

layout-line-thickness 924
layout-set-absolute-staff-size 924
layout-set-staff-size 924
ledger-lines::positions-from-ledgered-grob . 924
left-align-at-split-notes 924
lilypond-main 924
lilypond-version-outdated? 924
list-insert-separator 924
list-join 924
list-map 925
list-pad-left 925
list-pad-right 925
lookup-markup-command 925
ly:add-context-mod 895
ly:add-interface 895
ly:add-listener 895
ly:add-option 895
ly:all-grob-interfaces 896
ly:all-options 896
ly:all-output-backend-commands 896
ly:all-stencil-commands 896

ly:all-stencil-expressions 896
ly:angle 897
ly:append-to-option 897
ly:assoc-get 898
ly:axis-group-interface::add-element 898
ly:bar-line::calc-anchor 898
ly:bar-line::print 898
ly:base64-encode 898
ly:basic-progress 898
ly:bezier-extent 899
ly:bezier-extract 899
ly:book-add-bookpart! 900
ly:book-add-score! 900
ly:book-book-parts 900
ly:book-header 900
ly:book-paper 900
ly:book-process 900
ly:book-process-to-systems 900
ly:book-scores 900
ly:book-set-header! 900
ly:book? 900
ly:bp 900
ly:bracket 900
ly:break-alignment-interface::
find-nonempty-break-align-group 901
ly:broadcast 901
ly:cairo-output-stencil 901
ly:cairo-output-stencils 901
ly:camel-case->lisp-identifier 902
ly:chain-assoc-get 902
ly:check-expected-warnings 902
ly:cm 904
ly:command-line-code 904
ly:command-line-options 904
ly:connect-dispatchers 904
ly:context-alias? 904
ly:context-children 904
ly:context-current-moment 904
ly:context-def-lookup 905
ly:context-def-modify 905
ly:context-def? 905
ly:context-event-source 905
ly:context-events-below 905
ly:context-find 905
ly:context-grob-definition 905
ly:context-id 905
ly:context-matched-pop-property 905
ly:context-mod-apply! 905
ly:context-mod? 905
ly:context-name 905
ly:context-output-def 905
ly:context-parent 905
ly:context-property 905
ly:context-property-pop 906
ly:context-property-push 906
ly:context-property-where-defined 906
ly:context-pushpop-property 906
ly:context-schedule-moment 906
ly:context-set-property! 906
ly:context-unset-property 906
ly:context? 904
ly:debug 906
ly:default-scale 907
ly:deprecation-warning 909
ly:dimension? 910
ly:dir? 910
ly:directed 910
ly:disconnect-dispatchers 910
ly:dispatcher? 910
ly:duration->moment 910
ly:duration->number 911
ly:duration->string 911
ly:duration-compress 911
ly:duration-dot-count 911
ly:duration-factor 911
ly:duration-log 911
ly:duration-scale 911
ly:duration<? 910
ly:duration? 910
ly:effective-prefix 911
ly:engraver-announce-end-grob 912
ly:engraver-make-grob 912
ly:engraver-make-item 912
ly:engraver-make-spanner 912
ly:engraver-make-sticky 912
ly:error 913
ly:event-deep-copy 913
ly:event-length 913
ly:event-property 913
ly:event-set-property! 913
ly:event? 913
ly:expect-warning 913
ly:extract-subfont-from-collection 914
ly:find-file 914
ly:font-config-add-directory 915
ly:font-config-add-font 915
ly:font-config-display-fonts 916
ly:font-config-get-font-file 916
ly:font-design-size 916
ly:font-file-name 916
ly:font-get-glyph 916
ly:font-glyph-name-to-index 916
ly:font-index-to-charcode 916
ly:font-magnification 916
ly:font-metric? 916
ly:font-name 916
ly:format 916
ly:format-output 916
ly:generic-bound-extent 917
ly:get-all-function-documentation 917
ly:get-all-translators 917
ly:get-cff-offset 917
ly:get-context-mods 917
ly:get-font-format 917
ly:get-option 918
ly:get-spacing-spec 918
ly:grob-alist-chain 919
ly:grob-array->list 919
ly:grob-array-filter 919
ly:grob-array-length 919
ly:grob-array-ref 920
ly:grob-array? 919
ly:grob-basic-properties 920
ly:grob-chain-callback 920
ly:grob-common-refpoint 920
ly:grob-common-refpoint-of-array 920
ly:grob-default-font 920
ly:grob-extent 920
ly:grob-get-vertical-axis-group-index 920
ly:grob-interfaces 920

ly:grob-layout ... 920
ly:grob-list->grob-array ... 920
ly:grob-object ... 920
ly:grob-original ... 920
ly:grob-parent ... 920
ly:grob-pq< ... 920
ly:grob-properties? ... 920
ly:grob-property ... 920
ly:grob-property-data ... 921
ly:grob-pure-height ... 921
ly:grob-pure-property ... 921
ly:grob-pure-relative-coordinate ... 921
ly:grob-relative-coordinate ... 921
ly:grob-robust-relative-extent ... 921
ly:grob-script-priority-less ... 921
ly:grob-set-nested-property! ... 921
ly:grob-set-object! ... 921
ly:grob-set-parent! ... 921
ly:grob-set-property! ... 921
ly:grob-spanned-column-rank-interval ... 921
ly:grob-staff-position ... 921
ly:grob-suicide! ... 921
ly:grob-system ... 921
ly:grob-translate-axis! ... 921
ly:grob-vertical< ... 921
ly:grob? ... 918
ly:gulp-file ... 922
ly:gulp-file-utf8 ... 922
ly:has-glyph-names? ... 922
ly:hash-table-keys ... 922
ly:in-event-class? ... 922
ly:inch ... 922
ly:input-both-locations ... 923
ly:input-file-line-char-column ... 923
ly:input-location? ... 923
ly:input-message ... 923
ly:input-warning ... 923
ly:interpret-music-expression ... 923
ly:intlog2 ... 923
ly:item-break-dir ... 924
ly:item-get-column ... 924
ly:item? ... 923
ly:iterator? ... 924
ly:length ... 924
ly:lily-lexer? ... 924
ly:lily-parser? ... 924
ly:line-interface::line ... 924
ly:listened-event-class? ... 925
ly:listened-event-types ... 925
ly:listener? ... 925
ly:make-book ... 925
ly:make-book-part ... 925
ly:make-context-mod ... 926
ly:make-dispatcher ... 926
ly:make-duration ... 926
ly:make-global-context ... 927
ly:make-global-translator ... 927
ly:make-grob-properties ... 927
ly:make-listener ... 927
ly:make-moment ... 927
ly:make-music ... 928
ly:make-music-function ... 928
ly:make-music-relative! ... 928
ly:make-output-def ... 928
ly:make-page-label-marker ... 928
ly:make-page-permission-marker ... 928
ly:make-paper-outputter ... 928
ly:make-pitch ... 929
ly:make-prob ... 929
ly:make-rand-seed ... 929
ly:make-regex ... 929
ly:make-rotation ... 930
ly:make-scale ... 930
ly:make-scaling ... 930
ly:make-score ... 930
ly:make-skyline ... 931
ly:make-spring ... 931
ly:make-stencil ... 931
ly:make-stream-event ... 931
ly:make-tmpfile-name ... 931
ly:make-transform ... 931
ly:make-translation ... 931
ly:make-unpure-pure-container ... 933
ly:message ... 934
ly:minimal-breaking ... 934
ly:mm ... 935
ly:module->alist ... 935
ly:module-copy ... 935
ly:modules-lookup ... 935
ly:moment-add ... 935
ly:moment-div ... 935
ly:moment-grace ... 935
ly:moment-grace-denominator ... 935
ly:moment-grace-numerator ... 935
ly:moment-main ... 935
ly:moment-main-denominator ... 935
ly:moment-main-numerator ... 935
ly:moment-mod ... 935
ly:moment-mul ... 936
ly:moment-sub ... 936
ly:moment< ... 935
ly:moment? ... 935
ly:music-compress ... 936
ly:music-deep-copy ... 936
ly:music-duration-compress ... 936
ly:music-duration-length ... 936
ly:music-function-extract ... 936
ly:music-function-signature ... 936
ly:music-function? ... 936
ly:music-length ... 936
ly:music-list? ... 936
ly:music-mutable-properties ... 937
ly:music-output? ... 937
ly:music-property ... 937
ly:music-set-property! ... 937
ly:music-start ... 937
ly:music-transpose ... 937
ly:music? ... 936
ly:non-fatal-error ... 937
ly:note-column-accidentals ... 938
ly:note-column-dot-column ... 938
ly:note-extra-source-file ... 938
ly:note-head::stem-attachment ... 938
ly:note-scale? ... 938
ly:number->duration ... 938
ly:number->string ... 938
ly:one-line-auto-height-breaking ... 939
ly:one-line-breaking ... 939
ly:one-page-breaking ... 939
ly:optimal-breaking ... 939

ly:option-usage 939
ly:otf->cff 939
ly:otf-font-glyph-info 939
ly:otf-font-table-data 939
ly:otf-font? 939
ly:otf-glyph-count 940
ly:otf-glyph-list 940
ly:output-def-clone 940
ly:output-def-lookup 940
ly:output-def-parent 940
ly:output-def-scope 940
ly:output-def-set-variable! 940
ly:output-def? 940
ly:output-description 940
ly:output-file-name-for-input-file-name 940
ly:output-find-context-def 940
ly:outputter-close 940
ly:outputter-dump-stencil 940
ly:outputter-dump-string 940
ly:outputter-output-scheme 940
ly:outputter-port 940
ly:page-marker? 941
ly:page-turn-breaking 941
ly:pango-font-physical-fonts 941
ly:pango-font? 941
ly:paper-book-header 941
ly:paper-book-pages 941
ly:paper-book-paper 941
ly:paper-book-performances 941
ly:paper-book-scopes 941
ly:paper-book-systems 941
ly:paper-book? 941
ly:paper-column::break-align-width 941
ly:paper-column::print 942
ly:paper-fonts 942
ly:paper-get-font 942
ly:paper-get-number 942
ly:paper-outputscale 942
ly:paper-score-paper-systems 942
ly:paper-system? 942
ly:parse-file 942
ly:parse-init 942
ly:parse-string-expression 942
ly:parsed-undead-list! 942
ly:parser-append-to-include-path 942
ly:parser-clear-error 943
ly:parser-clone 943
ly:parser-define! 943
ly:parser-define-once! 943
ly:parser-error 943
ly:parser-has-error? 943
ly:parser-include-string 943
ly:parser-lookup 943
ly:parser-output-name 943
ly:parser-parse-string 943
ly:parser-set-note-names 943
ly:perform-text-replacements 943
ly:performance-headers 943
ly:performance-write 943
ly:pitch-alteration 944
ly:pitch-diff 944
ly:pitch-negate 944
ly:pitch-notename 944
ly:pitch-octave 944
ly:pitch-quartertones 944
ly:pitch-semitones 944
ly:pitch-steps 944
ly:pitch-tones 944
ly:pitch-transpose 944
ly:pitch<? 944
ly:pitch? 943
ly:png->eps-dump 944
ly:png-dimensions 944
ly:pointer-group-interface::add-grob 944
ly:position-on-line? 945
ly:prob-immutable-properties 945
ly:prob-mutable-properties 945
ly:prob-property 945
ly:prob-property? 945
ly:prob-set-property! 945
ly:prob-type? 945
ly:prob? 945
ly:programming-error 945
ly:progress 945
ly:property-lookup-stats 945
ly:pt 945
ly:pure-call 945
ly:regex-exec 946
ly:regex-exec->list 946
ly:regex-match-positions 946
ly:regex-match-prefix 946
ly:regex-match-substring 946
ly:regex-match-suffix 947
ly:regex-match? 946
ly:regex-quote 947
ly:regex-replace 947
ly:regex-split 947
ly:regex? 946
ly:register-stencil-expression 947
ly:register-translator 947
ly:relative-group-extent 947
ly:rename-file 948
ly:reset-all-fonts 948
ly:reset-options 948
ly:round-filled-box 948
ly:round-polygon 949
ly:run-translator 949
ly:score-add-output-def! 949
ly:score-embedded-format 949
ly:score-error? 949
ly:score-header 949
ly:score-music 950
ly:score-output-defs 950
ly:score-set-header! 950
ly:score? 949
ly:script-interface::calc-direction 950
ly:script-interface::print 950
ly:set-default-scale 951
ly:set-grob-creation-callback 951
ly:set-grob-modification-callback 951
ly:set-middle-C! 951
ly:set-option 951
ly:set-origin! 951
ly:set-property-cache-callback 952
ly:set-rand-seed 952
ly:skyline->points 952
ly:skyline-distance 952
ly:skyline-empty? 953
ly:skyline-height 953
ly:skyline-max-height 953

ly:skyline-max-height-position 953
ly:skyline-merge 953
ly:skyline-pad 953
ly:skyline-touching-point 953
ly:skyline? 952
ly:skylines-for-stencil 953
ly:smob-protects 953
ly:solve-spring-rod-problem 953
ly:source-file? 953
ly:source-files 953
ly:span-bar::before-line-breaking 953
ly:span-bar::calc-anchor 953
ly:span-bar::calc-glyph-name 953
ly:span-bar::print 954
ly:span-bar::width 954
ly:spanner-bound 954
ly:spanner-broken-into 954
ly:spanner-broken-neighbor 954
ly:spanner-set-bound! 954
ly:spanner? 954
ly:spawn 954
ly:spring-set-inverse-compress-strength! ... 954
ly:spring-set-inverse-stretch-strength! 954
ly:spring? 954
ly:staff-symbol-line-thickness 955
ly:staff-symbol-staff-radius 955
ly:staff-symbol-staff-space 955
ly:stderr-redirect 955
ly:stem::extremal-heads 955
ly:stencil-add 955
ly:stencil-aligned-to 955
ly:stencil-combine-at-edge 955
ly:stencil-empty? 955
ly:stencil-expr 956
ly:stencil-extent 956
ly:stencil-outline 956
ly:stencil-rotate 956
ly:stencil-rotate-absolute 956
ly:stencil-scale 956
ly:stencil-stack 956
ly:stencil-translate 956
ly:stencil-translate-axis 956
ly:stencil? 955
ly:stream-event? 957
ly:string-percent-encode 957
ly:string-substitute 958
ly:system-font-load 958
ly:text-interface::interpret-markup 958
ly:time-signature::calc-fraction 959
ly:time-signature::print 959
ly:time-signature::print-x 959
ly:time-tracer-include-and-remove-file 959
ly:time-tracer-restart 959
ly:time-tracer-set-file 959
ly:time-tracer-stop 959
ly:transform->list 959
ly:transform? 959
ly:translate-cpp-warning-scheme 959
ly:translator-context 960
ly:translator-description 960
ly:translator-group? 960
ly:translator-name 960
ly:translator? 959
ly:transpose-key-alist 960
ly:ttf->pfa 960
ly:ttf-ps-name 960
ly:tuplet-description? 960
ly:unpure-call 961
ly:unpure-pure-container-pure-part 961
ly:unpure-pure-container-unpure-part 961
ly:unpure-pure-container? 961
ly:usage 961
ly:verbose-output? 961
ly:version 961
ly:version? 961
ly:volta-bracket::calc-shorten-pair 962
ly:warning 962
ly:warning-located 962
ly:wide-char->utf-8 962
lyric-hyphen::vaticana-style 925
lyric-text::print 925

M

make-accidental-dodecaphonic-rule 925
make-accidental-rule 925
make-bow-stencil 926
make-c-time-signature-markup 926
make-circle-stencil 926
make-clef-set 926
make-connected-line 926
make-connected-path-stencil 926
make-cue-clef-set 926
make-cue-clef-unset 926
make-duration-of-length 926
make-ellipse-stencil 926
make-engraver 927
make-filled-box-stencil 927
make-glyph-time-signature-markup 927
make-grob-property-override 927
make-grob-property-revert 927
make-grob-property-set 927
make-harmonic 927
make-line-stencil 927
make-modal-inverter 927
make-modal-transposer 927
make-music 928
make-oval-stencil 928
make-part-combine-context-changes 928
make-part-combine-marks 929
make-partial-ellipse-stencil 929
make-path-stencil 929
make-performer 929
make-relative 929
make-repeat 930
make-semitone->pitch 931
make-stencil-boxer 931
make-stencil-circler 931
make-tmpfile 931
make-translator 932
make-transparent-box-stencil 932
map-selected-alist-keys 933
map-some-music 933
marked-up-headfoot 933
marked-up-title 933
markup 933
markup->string 933
markup-command-list? 933
markup-default-to-string-method 933

markup-lambda 934
markup-list-lambda 934
markup-list? 934
matrix-rotate-counterclockwise 934
measure-counter::text 934
mensural-flag 934
middle-broken-spanner? 934
midi-program 934
minmax/cmp 934
mmrest-of-length 935
modern-straight-flag 935
music->make-music 936
music-clone 936
music-filter 936
music-is-of-type? 936
music-map 936
music-pitches 937
music-selective-filter 937
music-selective-map 937
music-separator? 937
music-type-predicate 937

N

neo-modern-accidental-rule 937
no-flag 937
normal-flag 937
normalize-color 938
not-first-broken-spanner? 938
not-last-broken-spanner? 938
note-to-cluster 938
number-format 938

O

offset-fret 938
offsetter 939
old-straight-flag 939
optional-material-bracket::positions 939
optionally-grouped-beat-structure->beat-structure 939
optionally-grouped-beat-structure->submeasure-structure 939
output-module? 940
oval-stencil 940
override-head-style 941
override-time-signature-setting 941

P

pango-pf-file-name 941
pango-pf-font-name 941
pango-pf-fontindex 941
parenthesize-stencil 942
parse-terse-string 942
percussion? 943
pitch->alteration 944
pitch->name 944
polar->rectangular 945
prepend-alist-chain 945
pure-chain-offset-callback 945

R

ratio->fret 946
ratio->pitch 946
read-lily-expression 946
recording-group-emulate 946
remove-from-tag-group 947
remove-grace-property 948
remove-whitespace 948
reset-tag-group 948
reset-tag-groups 948
retrieve-glyph-flag 948
retrograde-music 948
revert-fontSize 948
revert-head-style 948
revert-props 948
rounded-box-stencil 949

S

sane-time-signature? 949
scale-beam-thickness 949
scale-fontSize 949
scale-layout 949
scale-props 949
scorify-music 950
seconds->moment 950
select-head-glyph 950
self-alignment-interface::
  self-aligned-on-breakable 950
sequential-music-to-chord-exceptions 950
set-accidental-style 950
set-default-paper-size 951
set-global-staff-size 951
set-mus-properties! 951
set-output-property 952
set-paper-size 952
shift-one-duration-log 952
shift-right-at-line-begin 952
shift-semitone->pitch 952
skip->rest 952
skip-of-length 952
skip-of-moment-span 952
span-bar::compound-bar-line 954
Span_stem_engraver 954
split-list-by-group-lengths 954
split-list-by-separator 954
stack-lines 954
stack-stencil-line 955
stack-stencils 955
stack-stencils-padding-list 955
staff-ellipsis::print 955
staff-ellipsis::pure-height 955
stencil-pad-around 956
stencil-squash-extent 956
stencil-true-extent 956
stencil-whiteout 956
stencil-whiteout-box 957
stencil-whiteout-outline 957
stencil-with-color 957
straight-flag 957
string->string-list 957
style-note-heads 958
suggest-convert-ly-message 958
symbol-concatenate 958

T

tab-note-head::handle-ties 958
tab-note-head::print 958
tag-group-defined? 958
tag-group-get 958
tags-keep-predicate 958
tags-remove-predicate 958
teaching-accidental-rule 958
time-signature->fraction 959
time-signature? 959
to-staff-space 959
toe-heel-subst-stencil 959
tsig-abbr-expand 960

U

unbroken-or-first-broken-spanner? 960
unbroken-or-last-broken-spanner? 960
unbroken-spanner? 960
unfold-repeats 960
unfold-repeats-fully 960
uniq-list 961
uniqued-alist 961
unity-if-multimeasure 961
unspecified-music? 961

V

value-for-spanner-piece 961
voicify-music 961
volta-bracket::calc-hook-visibility 961
volta-spec-music 962

W

write-me 962