# LilyPond

The music typesetter

# Internals Reference

**The LilyPond development team**

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For LilyPond version 2.13.39

# Table of Contents


**1 Music definitions ..... 2**

1.1 Music expressions ..... 2

1.1.1 AbsoluteDynamicEvent ..... 2
1.1.2 AnnotateOutputEvent ..... 2
1.1.3 ApplyContext ..... 2
1.1.4 ApplyOutputEvent ..... 3
1.1.5 ArpeggioEvent ..... 3
1.1.6 ArticulationEvent ..... 3
1.1.7 AutoChangeMusic ..... 4
1.1.8 BarCheck ..... 4
1.1.9 BassFigureEvent ..... 5
1.1.10 BeamEvent ..... 5
1.1.11 BeamForbidEvent ..... 5
1.1.12 BendAfterEvent ..... 6
1.1.13 BreakDynamicSpanEvent ..... 6
1.1.14 BreathingEvent ..... 6
1.1.15 ClusterNoteEvent ..... 7
1.1.16 CompletizeExtenderEvent ..... 7
1.1.17 ContextChange ..... 7
1.1.18 ContextSpeccedMusic ..... 8
1.1.19 CrescendoEvent ..... 8
1.1.20 DecrescendoEvent ..... 9
1.1.21 EpisemaEvent ..... 9
1.1.22 Event ..... 9
1.1.23 EventChord ..... 10
1.1.24 ExtenderEvent ..... 10
1.1.25 FingeringEvent ..... 10
1.1.26 GlissandoEvent ..... 11
1.1.27 GraceMusic ..... 11
1.1.28 HarmonicEvent ..... 11
1.1.29 HyphenEvent ..... 12
1.1.30 KeyChangeEvent ..... 12
1.1.31 LabelEvent ..... 12
1.1.32 LaissezVibrerEvent ..... 13
1.1.33 LigatureEvent ..... 13
1.1.34 LineBreakEvent ..... 13
1.1.35 LyricCombineMusic ..... 14
1.1.36 LyricEvent ..... 14
1.1.37 MarkEvent ..... 14
1.1.38 MultiMeasureRestEvent ..... 15
1.1.39 MultiMeasureRestMusic ..... 15
1.1.40 MultiMeasureTextEvent ..... 16
1.1.41 Music ..... 16
1.1.42 NoteEvent ..... 16
1.1.43 NoteGroupingEvent ..... 17
1.1.44 OttavaMusic ..... 17
1.1.45 OverrideProperty ..... 17
1.1.46 PageBreakEvent ..... 18

1.1.47 PageTurnEvent . . . 18
1.1.48 PartCombineForceEvent . . . 18
1.1.49 PartCombineMusic . . . 19
1.1.50 PartialSet . . . 19
1.1.51 PercentEvent . . . 20
1.1.52 PercentRepeatedMusic . . . 20
1.1.53 PesOrFlexaEvent . . . 20
1.1.54 PhrasingSlurEvent . . . 21
1.1.55 PropertySet . . . 21
1.1.56 PropertyUnset . . . 21
1.1.57 QuoteMusic . . . 22
1.1.58 RelativeOctaveCheck . . . 22
1.1.59 RelativeOctaveMusic . . . 23
1.1.60 RepeatTieEvent . . . 23
1.1.61 RepeatedChord . . . 23
1.1.62 RepeatedMusic . . . 24
1.1.63 RestEvent . . . 24
1.1.64 RevertProperty . . . 25
1.1.65 ScriptEvent . . . 25
1.1.66 SequentialMusic . . . 25
1.1.67 SimultaneousMusic . . . 26
1.1.68 SkipEvent . . . 27
1.1.69 SkipMusic . . . 27
1.1.70 SlurEvent . . . 27
1.1.71 SoloOneEvent . . . 28
1.1.72 SoloTwoEvent . . . 28
1.1.73 SostenutoEvent . . . 29
1.1.74 SpacingSectionEvent . . . 29
1.1.75 SpanEvent . . . 29
1.1.76 StaffSpanEvent . . . 30
1.1.77 StringNumberEvent . . . 30
1.1.78 StrokeFingerEvent . . . 30
1.1.79 SustainEvent . . . 31
1.1.80 TextScriptEvent . . . 31
1.1.81 TextSpanEvent . . . 31
1.1.82 TieEvent . . . 32
1.1.83 TimeScaledMusic . . . 32
1.1.84 TimeSignatureMusic . . . 32
1.1.85 TransposedMusic . . . 33
1.1.86 TremoloEvent . . . 33
1.1.87 TremoloRepeatedMusic . . . 34
1.1.88 TremoloSpanEvent . . . 34
1.1.89 TrillSpanEvent . . . 35
1.1.90 TupletSpanEvent . . . 35
1.1.91 UnaCordaEvent . . . 35
1.1.92 UnfoldedRepeatedMusic . . . 36
1.1.93 UnisonoEvent . . . 36
1.1.94 UnrelativableMusic . . . 36
1.1.95 VoiceSeparator . . . 37
1.1.96 VoltaRepeatedMusic . . . 37
1.2 Music classes . . . 38
1.2.1 absolute-dynamic-event . . . 38
1.2.2 annotate-output-event . . . 38
1.2.3 apply-output-event . . . 38

1.2.4 arpeggio-event . . . 38
1.2.5 articulation-event . . . 38
1.2.6 bass-figure-event . . . 38
1.2.7 beam-event . . . 38
1.2.8 beam-forbid-event . . . 39
1.2.9 bend-after-event . . . 39
1.2.10 break-dynamic-span-event . . . 39
1.2.11 break-event . . . 39
1.2.12 break-span-event . . . 39
1.2.13 breathing-event . . . 39
1.2.14 cluster-note-event . . . 39
1.2.15 completize-extender-event . . . 39
1.2.16 crescendo-event . . . 39
1.2.17 decrescendo-event . . . 39
1.2.18 dynamic-event . . . 40
1.2.19 episema-event . . . 40
1.2.20 extender-event . . . 40
1.2.21 fingering-event . . . 40
1.2.22 glissando-event . . . 40
1.2.23 harmonic-event . . . 40
1.2.24 hyphen-event . . . 40
1.2.25 key-change-event . . . 40
1.2.26 label-event . . . 40
1.2.27 laissez-vibrer-event . . . 40
1.2.28 layout-instruction-event . . . 41
1.2.29 ligature-event . . . 41
1.2.30 line-break-event . . . 41
1.2.31 lyric-event . . . 41
1.2.32 mark-event . . . 41
1.2.33 melodic-event . . . 41
1.2.34 multi-measure-rest-event . . . 41
1.2.35 multi-measure-text-event . . . 41
1.2.36 music-event . . . 41
1.2.37 note-event . . . 42
1.2.38 note-grouping-event . . . 42
1.2.39 page-break-event . . . 42
1.2.40 page-turn-event . . . 42
1.2.41 part-combine-event . . . 42
1.2.42 part-combine-force-event . . . 43
1.2.43 pedal-event . . . 43
1.2.44 percent-event . . . 43
1.2.45 pes-or-flexa-event . . . 43
1.2.46 phrasing-slur-event . . . 43
1.2.47 repeat-tie-event . . . 43
1.2.48 rest-event . . . 43
1.2.49 rhythmic-event . . . 43
1.2.50 script-event . . . 43
1.2.51 skip-event . . . 44
1.2.52 slur-event . . . 44
1.2.53 solo-one-event . . . 44
1.2.54 solo-two-event . . . 44
1.2.55 sostenuto-event . . . 44
1.2.56 spacing-section-event . . . 44
1.2.57 span-dynamic-event . . . 44

1.2.58 span-event ... 44
1.2.59 staff-span-event ... 45
1.2.60 StreamEvent ... 45
1.2.61 string-number-event ... 45
1.2.62 stroke-finger-event ... 45
1.2.63 sustain-event ... 46
1.2.64 text-script-event ... 46
1.2.65 text-span-event ... 46
1.2.66 tie-event ... 46
1.2.67 tremolo-event ... 46
1.2.68 tremolo-span-event ... 46
1.2.69 trill-span-event ... 46
1.2.70 tuplet-span-event ... 46
1.2.71 una-corda-event ... 46
1.2.72 unisono-event ... 47
1.3 Music properties ... 47

**2 Translation ... 52**
2.1 Contexts ... 52
2.1.1 ChoirStaff ... 52
2.1.2 ChordNames ... 53
2.1.3 CueVoice ... 54
2.1.4 Devnull ... 67
2.1.5 DrumStaff ... 67
2.1.6 DrumVoice ... 72
2.1.7 Dynamics ... 83
2.1.8 FiguredBass ... 86
2.1.9 FretBoards ... 88
2.1.10 Global ... 90
2.1.11 GrandStaff ... 90
2.1.12 GregorianTranscriptionStaff ... 91
2.1.13 GregorianTranscriptionVoice ... 100
2.1.14 Lyrics ... 113
2.1.15 MensuralStaff ... 115
2.1.16 MensuralVoice ... 125
2.1.17 NoteNames ... 137
2.1.18 PianoStaff ... 138
2.1.19 RhythmicStaff ... 140
2.1.20 Score ... 143
2.1.21 Staff ... 155
2.1.22 StaffGroup ... 164
2.1.23 TabStaff ... 165
2.1.24 TabVoice ... 171
2.1.25 VaticanaStaff ... 185
2.1.26 VaticanaVoice ... 194
2.1.27 Voice ... 205
2.2 Engravers and Performers ... 217
2.2.1 Accidental_engraver ... 217
2.2.2 Ambitus_engraver ... 219
2.2.3 Arpeggio_engraver ... 219
2.2.4 Auto_beam_engraver ... 219
2.2.5 Axis_group_engraver ... 220
2.2.6 Balloon_engraver ... 220
2.2.7 Bar_engraver ... 220

2.2.8 Bar_number_engraver . . . 221
2.2.9 Beam_engraver . . . 221
2.2.10 Beam_performer . . . 222
2.2.11 Bend_engraver . . . 222
2.2.12 Break_align_engraver . . . 222
2.2.13 Breathing_sign_engraver . . . 223
2.2.14 Chord_name_engraver . . . 223
2.2.15 Chord_tremolo_engraver . . . 223
2.2.16 Clef_engraver . . . 224
2.2.17 Cluster_spanner_engraver . . . 224
2.2.18 Collision_engraver . . . 224
2.2.19 Completion_heads_engraver . . . 225
2.2.20 Control_track_performer . . . 225
2.2.21 Custos_engraver . . . 225
2.2.22 Default_bar_line_engraver . . . 225
2.2.23 Dot_column_engraver . . . 226
2.2.24 Dots_engraver . . . 226
2.2.25 Drum_note_performer . . . 227
2.2.26 Drum_notes_engraver . . . 227
2.2.27 Dynamic_align_engraver . . . 227
2.2.28 Dynamic_engraver . . . 227
2.2.29 Dynamic_performer . . . 228
2.2.30 Engraver . . . 228
2.2.31 Episema_engraver . . . 228
2.2.32 Extender_engraver . . . 228
2.2.33 Figured_bass_engraver . . . 229
2.2.34 Figured_bass_position_engraver . . . 229
2.2.35 Fingering_engraver . . . 229
2.2.36 Font_size_engraver . . . 230
2.2.37 Forbid_line_break_engraver . . . 230
2.2.38 Fretboard_engraver . . . 230
2.2.39 Glissando_engraver . . . 231
2.2.40 Grace_beam_engraver . . . 231
2.2.41 Grace_engraver . . . 232
2.2.42 Grace_spacing_engraver . . . 232
2.2.43 Grid_line_span_engraver . . . 232
2.2.44 Grid_point_engraver . . . 232
2.2.45 Grob_pq_engraver . . . 233
2.2.46 Hara_kiri_engraver . . . 233
2.2.47 Horizontal_bracket_engraver . . . 233
2.2.48 Hyphen_engraver . . . 233
2.2.49 Instrument_name_engraver . . . 234
2.2.50 Instrument_switch_engraver . . . 234
2.2.51 Keep_alive_together_engraver . . . 234
2.2.52 Key_engraver . . . 235
2.2.53 Key_performer . . . 236
2.2.54 Laissez_vibrer_engraver . . . 236
2.2.55 Ledger_line_engraver . . . 236
2.2.56 Ligature_bracket_engraver . . . 236
2.2.57 Lyric_engraver . . . 236
2.2.58 Lyric_performer . . . 237
2.2.59 Mark_engraver . . . 237
2.2.60 Measure_grouping_engraver . . . 237
2.2.61 Melody_engraver . . . 238

2.2.62 Mensural_ligature_engraver . . . 238
2.2.63 Metronome_mark_engraver . . . 238
2.2.64 Multi_measure_rest_engraver . . . 238
2.2.65 New_dynamic_engraver . . . 239
2.2.66 New_fingering_engraver . . . 240
2.2.67 Note_head_line_engraver . . . 240
2.2.68 Note_heads_engraver . . . 240
2.2.69 Note_name_engraver . . . 241
2.2.70 Note_performer . . . 241
2.2.71 Note_spacing_engraver . . . 241
2.2.72 Ottava_spanner_engraver . . . 241
2.2.73 Output_property_engraver . . . 242
2.2.74 Page_turn_engraver . . . 242
2.2.75 Paper_column_engraver . . . 242
2.2.76 Parenthesis_engraver . . . 243
2.2.77 Part_combine_engraver . . . 243
2.2.78 Percent_repeat_engraver . . . 243
2.2.79 Phrasing_slur_engraver . . . 244
2.2.80 Piano_pedal_align_engraver . . . 244
2.2.81 Piano_pedal_engraver . . . 245
2.2.82 Piano_pedal_performer . . . 245
2.2.83 Pitch_squash_engraver . . . 245
2.2.84 Pitched_trill_engraver . . . 246
2.2.85 Repeat_acknowledge_engraver . . . 246
2.2.86 Repeat_tie_engraver . . . 246
2.2.87 Rest_collision_engraver . . . 246
2.2.88 Rest_engraver . . . 247
2.2.89 Rhythmic_column_engraver . . . 247
2.2.90 Scheme_engraver . . . 247
2.2.91 Script_column_engraver . . . 247
2.2.92 Script_engraver . . . 248
2.2.93 Script_row_engraver . . . 248
2.2.94 Separating_line_group_engraver . . . 248
2.2.95 Slash_repeat_engraver . . . 249
2.2.96 Slur_engraver . . . 249
2.2.97 Slur_performer . . . 249
2.2.98 Spacing_engraver . . . 249
2.2.99 Span_arpeggio_engraver . . . 250
2.2.100 Span_bar_engraver . . . 250
2.2.101 Spanner_break_forbid_engraver . . . 250
2.2.102 Staff_collecting_engraver . . . 250
2.2.103 Staff_performer . . . 251
2.2.104 Staff_symbol_engraver . . . 251
2.2.105 Stanza_number_align_engraver . . . 251
2.2.106 Stanza_number_engraver . . . 251
2.2.107 Stem_engraver . . . 251
2.2.108 System_start_delimiter_engraver . . . 252
2.2.109 Tab_harmonic_engraver . . . 252
2.2.110 Tab_note_heads_engraver . . . 252
2.2.111 Tab_staff_symbol_engraver . . . 253
2.2.112 Tempo_performer . . . 253
2.2.113 Text_engraver . . . 254
2.2.114 Text_spanner_engraver . . . 254
2.2.115 Tie_engraver . . . 254

2.2.116 Tie_performer ... 254
2.2.117 Time_signature_engraver ... 255
2.2.118 Time_signature_performer ... 255
2.2.119 Timing_translator ... 255
2.2.120 Translator ... 256
2.2.121 Trill_spanner_engraver ... 256
2.2.122 Tuplet_engraver ... 256
2.2.123 Tweak_engraver ... 257
2.2.124 Vaticana_ligature_engraver ... 257
2.2.125 Vertical_align_engraver ... 257
2.2.126 Volta_engraver ... 257
2.3 Tunable context properties ... 258
2.4 Internal context properties ... 268

**3 Backend ... 270**

3.1 All layout objects ... 270
3.1.1 Accidental ... 270
3.1.2 AccidentalCautionary ... 270
3.1.3 AccidentalPlacement ... 271
3.1.4 AccidentalSuggestion ... 272
3.1.5 Ambitus ... 273
3.1.6 AmbitusAccidental ... 274
3.1.7 AmbitusLine ... 275
3.1.8 AmbitusNoteHead ... 275
3.1.9 Arpeggio ... 276
3.1.10 BalloonTextItem ... 277
3.1.11 BarLine ... 277
3.1.12 BarNumber ... 279
3.1.13 BassFigure ... 281
3.1.14 BassFigureAlignment ... 281
3.1.15 BassFigureAlignmentPositioning ... 281
3.1.16 BassFigureBracket ... 282
3.1.17 BassFigureContinuation ... 282
3.1.18 BassFigureLine ... 283
3.1.19 Beam ... 283
3.1.20 BendAfter ... 285
3.1.21 BreakAlignGroup ... 285
3.1.22 BreakAlignment ... 286
3.1.23 BreathingSign ... 287
3.1.24 ChordName ... 287
3.1.25 Clef ... 288
3.1.26 ClusterSpanner ... 289
3.1.27 ClusterSpannerBeacon ... 290
3.1.28 CombineTextScript ... 290
3.1.29 Custos ... 292
3.1.30 DotColumn ... 292
3.1.31 Dots ... 293
3.1.32 DoublePercentRepeat ... 293
3.1.33 DoublePercentRepeatCounter ... 294
3.1.34 DynamicLineSpanner ... 296
3.1.35 DynamicText ... 297
3.1.36 DynamicTextSpanner ... 298
3.1.37 Episema ... 299
3.1.38 Fingering ... 300

3.1.39 FretBoard . . . 302
3.1.40 Glissando . . . 303
3.1.41 GraceSpacing . . . 304
3.1.42 GridLine . . . 304
3.1.43 GridPoint . . . 305
3.1.44 Hairpin . . . 305
3.1.45 HarmonicParenthesesItem . . . 307
3.1.46 HorizontalBracket . . . 307
3.1.47 InstrumentName . . . 308
3.1.48 InstrumentSwitch . . . 309
3.1.49 KeyCancellation . . . 310
3.1.50 KeySignature . . . 311
3.1.51 LaissezVibrerTie . . . 312
3.1.52 LaissezVibrerTieColumn . . . 313
3.1.53 LedgerLineSpanner . . . 313
3.1.54 LeftEdge . . . 314
3.1.55 LigatureBracket . . . 314
3.1.56 LyricExtender . . . 315
3.1.57 LyricHyphen . . . 316
3.1.58 LyricSpace . . . 317
3.1.59 LyricText . . . 317
3.1.60 MeasureGrouping . . . 318
3.1.61 MelodyItem . . . 319
3.1.62 MensuralLigature . . . 319
3.1.63 MetronomeMark . . . 320
3.1.64 MultiMeasureRest . . . 321
3.1.65 MultiMeasureRestNumber . . . 322
3.1.66 MultiMeasureRestText . . . 323
3.1.67 NonMusicalPaperColumn . . . 324
3.1.68 NoteCollision . . . 325
3.1.69 NoteColumn . . . 326
3.1.70 NoteHead . . . 326
3.1.71 NoteName . . . 327
3.1.72 NoteSpacing . . . 327
3.1.73 OctavateEight . . . 328
3.1.74 OttavaBracket . . . 329
3.1.75 PaperColumn . . . 330
3.1.76 ParenthesesItem . . . 331
3.1.77 PercentRepeat . . . 331
3.1.78 PercentRepeatCounter . . . 332
3.1.79 PhrasingSlur . . . 333
3.1.80 PianoPedalBracket . . . 334
3.1.81 RehearsalMark . . . 335
3.1.82 RepeatSlash . . . 337
3.1.83 RepeatTie . . . 337
3.1.84 RepeatTieColumn . . . 338
3.1.85 Rest . . . 339
3.1.86 RestCollision . . . 339
3.1.87 Script . . . 339
3.1.88 ScriptColumn . . . 340
3.1.89 ScriptRow . . . 341
3.1.90 Slur . . . 341
3.1.91 SostenutoPedal . . . 342
3.1.92 SostenutoPedalLineSpanner . . . 343

3.1.93 SpacingSpanner . . . 344
3.1.94 SpanBar . . . 345
3.1.95 StaffGrouper . . . 346
3.1.96 StaffSpacing . . . 347
3.1.97 StaffSymbol . . . 347
3.1.98 StanzaNumber . . . 348
3.1.99 Stem . . . 348
3.1.100 StemTremolo . . . 350
3.1.101 StringNumber . . . 351
3.1.102 StrokeFinger . . . 352
3.1.103 SustainPedal . . . 353
3.1.104 SustainPedalLineSpanner . . . 354
3.1.105 System . . . 355
3.1.106 SystemStartBar . . . 355
3.1.107 SystemStartBrace . . . 356
3.1.108 SystemStartBracket . . . 357
3.1.109 SystemStartSquare . . . 358
3.1.110 TabNoteHead . . . 358
3.1.111 TextScript . . . 360
3.1.112 TextSpanner . . . 361
3.1.113 Tie . . . 362
3.1.114 TieColumn . . . 364
3.1.115 TimeSignature . . . 364
3.1.116 TrillPitchAccidental . . . 365
3.1.117 TrillPitchGroup . . . 366
3.1.118 TrillPitchHead . . . 367
3.1.119 TrillSpanner . . . 368
3.1.120 TupletBracket . . . 369
3.1.121 TupletNumber . . . 370
3.1.122 UnaCordaPedal . . . 371
3.1.123 UnaCordaPedalLineSpanner . . . 372
3.1.124 VaticanaLigature . . . 373
3.1.125 VerticalAlignment . . . 373
3.1.126 VerticalAxisGroup . . . 373
3.1.127 VoiceFollower . . . 375
3.1.128 VoltaBracket . . . 376
3.1.129 VoltaBracketSpanner . . . 376
3.2 Graphical Object Interfaces . . . 378
3.2.1 accidental-interface . . . 378
3.2.2 accidental-placement-interface . . . 378
3.2.3 accidental-suggestion-interface . . . 379
3.2.4 align-interface . . . 379
3.2.5 ambitus-interface . . . 380
3.2.6 arpeggio-interface . . . 380
3.2.7 axis-group-interface . . . 380
3.2.8 balloon-interface . . . 383
3.2.9 bar-line-interface . . . 383
3.2.10 bass-figure-alignment-interface . . . 384
3.2.11 bass-figure-interface . . . 384
3.2.12 beam-interface . . . 384
3.2.13 bend-after-interface . . . 387
3.2.14 break-alignable-interface . . . 387
3.2.15 break-aligned-interface . . . 387
3.2.16 break-alignment-interface . . . 388

3.2.17 breathing-sign-interface . . . 389
3.2.18 chord-name-interface . . . 389
3.2.19 clef-interface . . . 389
3.2.20 cluster-beacon-interface . . . 389
3.2.21 cluster-interface . . . 390
3.2.22 custos-interface . . . 390
3.2.23 dot-column-interface . . . 390
3.2.24 dots-interface . . . 391
3.2.25 dynamic-interface . . . 391
3.2.26 dynamic-line-spanner-interface . . . 391
3.2.27 dynamic-text-interface . . . 392
3.2.28 dynamic-text-spanner-interface . . . 392
3.2.29 enclosing-bracket-interface . . . 392
3.2.30 episema-interface . . . 393
3.2.31 figured-bass-continuation-interface . . . 393
3.2.32 finger-interface . . . 393
3.2.33 font-interface . . . 393
3.2.34 fret-diagram-interface . . . 394
3.2.35 grace-spacing-interface . . . 396
3.2.36 gregorian-ligature-interface . . . 396
3.2.37 grid-line-interface . . . 397
3.2.38 grid-point-interface . . . 397
3.2.39 grob-interface . . . 397
3.2.40 hairpin-interface . . . 401
3.2.41 hara-kiri-group-spanner-interface . . . 401
3.2.42 horizontal-bracket-interface . . . 402
3.2.43 instrument-specific-markup-interface . . . 402
3.2.44 item-interface . . . 404
3.2.45 key-cancellation-interface . . . 406
3.2.46 key-signature-interface . . . 406
3.2.47 ledger-line-spanner-interface . . . 406
3.2.48 ledgered-interface . . . 407
3.2.49 ligature-bracket-interface . . . 407
3.2.50 ligature-interface . . . 407
3.2.51 line-interface . . . 407
3.2.52 line-spanner-interface . . . 408
3.2.53 lyric-extender-interface . . . 409
3.2.54 lyric-hyphen-interface . . . 409
3.2.55 lyric-interface . . . 410
3.2.56 lyric-syllable-interface . . . 410
3.2.57 mark-interface . . . 410
3.2.58 measure-grouping-interface . . . 410
3.2.59 melody-spanner-interface . . . 410
3.2.60 mensural-ligature-interface . . . 411
3.2.61 metronome-mark-interface . . . 411
3.2.62 multi-measure-interface . . . 411
3.2.63 multi-measure-rest-interface . . . 411
3.2.64 note-collision-interface . . . 412
3.2.65 note-column-interface . . . 413
3.2.66 note-head-interface . . . 413
3.2.67 note-name-interface . . . 414
3.2.68 note-spacing-interface . . . 414
3.2.69 only-prebreak-interface . . . 414
3.2.70 ottava-bracket-interface . . . 415

3.2.71 paper-column-interface . . . 415
3.2.72 parentheses-interface . . . 416
3.2.73 percent-repeat-interface . . . 417
3.2.74 percent-repeat-item-interface . . . 417
3.2.75 piano-pedal-bracket-interface . . . 418
3.2.76 piano-pedal-interface . . . 418
3.2.77 piano-pedal-script-interface . . . 418
3.2.78 pitched-trill-interface . . . 418
3.2.79 rest-collision-interface . . . 418
3.2.80 rest-interface . . . 419
3.2.81 rhythmic-grob-interface . . . 419
3.2.82 rhythmic-head-interface . . . 419
3.2.83 script-column-interface . . . 420
3.2.84 script-interface . . . 420
3.2.85 self-alignment-interface . . . 421
3.2.86 semi-tie-column-interface . . . 421
3.2.87 semi-tie-interface . . . 422
3.2.88 separation-item-interface . . . 422
3.2.89 side-position-interface . . . 423
3.2.90 slur-interface . . . 424
3.2.91 spaceable-grob-interface . . . 426
3.2.92 spacing-interface . . . 427
3.2.93 spacing-options-interface . . . 427
3.2.94 spacing-spanner-interface . . . 428
3.2.95 span-bar-interface . . . 428
3.2.96 spanner-interface . . . 429
3.2.97 staff-grouper-interface . . . 430
3.2.98 staff-spacing-interface . . . 430
3.2.99 staff-symbol-interface . . . 431
3.2.100 staff-symbol-referencer-interface . . . 431
3.2.101 stanza-number-interface . . . 432
3.2.102 stem-interface . . . 432
3.2.103 stem-tremolo-interface . . . 434
3.2.104 string-number-interface . . . 434
3.2.105 stroke-finger-interface . . . 435
3.2.106 system-interface . . . 435
3.2.107 system-start-delimiter-interface . . . 435
3.2.108 system-start-text-interface . . . 436
3.2.109 tab-note-head-interface . . . 436
3.2.110 text-interface . . . 436
3.2.111 text-script-interface . . . 437
3.2.112 tie-column-interface . . . 438
3.2.113 tie-interface . . . 438
3.2.114 time-signature-interface . . . 439
3.2.115 trill-pitch-accidental-interface . . . 440
3.2.116 trill-spanner-interface . . . 440
3.2.117 tuplet-bracket-interface . . . 440
3.2.118 tuplet-number-interface . . . 441
3.2.119 unbreakable-spanner-interface . . . 442
3.2.120 vaticana-ligature-interface . . . 442
3.2.121 volta-bracket-interface . . . 442
3.2.122 volta-interface . . . 443
3.3 User backend properties . . . 443
3.4 Internal backend properties . . . 459

**4 Scheme functions** . . . . . **465**

**Appendix A Indices** . . . . . **485**

A.1 Concept index . . . . . 485
A.2 Function index . . . . . 485

This is the Internals Reference (IR) for version 2.13.39 of LilyPond, the GNU music typesetter.

# 1 Music definitions

## 1.1 Music expressions

### 1.1.1 AbsoluteDynamicEvent

Create a dynamic mark.

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

Event classes: Section 1.2.1 [absolute-dynamic-event], page 38, Section 1.2.18 [dynamic-event], page 40, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.28 [Dynamic_engraver], page 227, Section 2.2.29 [Dynamic_performer], page 228 and Section 2.2.65 [New_dynamic_engraver], page 239.

Properties:

`name` (symbol):
`'AbsoluteDynamicEvent`

Name of this music object.

`types` (list):
`'(general-music event dynamic-event absolute-dynamic-event)`

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

### 1.1.2 AnnotateOutputEvent

Print an annotation of an output element.

Event classes: Section 1.2.2 [annotate-output-event], page 38, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.6 [Balloon_engraver], page 220.

Properties:

`name` (symbol):
`'AnnotateOutputEvent`

Name of this music object.

`types` (list):
`'(general-music event annotate-output-event)`

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

### 1.1.3 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):
`'(general-music apply-context)`
The types of this music object; determines by what engraver this music expression is processed.

### 1.1.4 ApplyOutputEvent

Call the argument with all current grobs during interpreting phase.

Syntax: `\applyOutput #'context func`

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

Event classes: Section 1.2.3 [apply-output-event], page 38, Section 1.2.28 [layout-instruction-event], page 41, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.73 [Output_property_engraver], page 242.

Properties:

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

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

### 1.1.5 ArpeggioEvent

Make an arpeggio on this note.

Syntax: *note*`-\arpeggio`

Event classes: Section 1.2.4 [arpeggio-event], page 38, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.3 [Arpeggio_engraver], page 219.

Properties:

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

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

### 1.1.6 ArticulationEvent

Add an articulation marking to a note.

Syntax: *note*`xy`, 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: Section 1.2.5 [articulation-event], page 38, Section 1.2.36 [music-event], page 41, Section 1.2.50 [script-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.92 [Script_engraver], page 248.

Properties:

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

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

### 1.1.7 AutoChangeMusic

Used for making voices that switch between piano staves automatically.

Properties:

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

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

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

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

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

### 1.1.8 BarCheck

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

Properties:

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

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

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

### 1.1.9 BassFigureEvent

Print a bass-figure text.

Event classes: Section 1.2.6 [bass-figure-event], page 38, Section 1.2.36 [music-event], page 41, Section 1.2.49 [rhythmic-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.33 [Figured_bass_engraver], page 229.

Properties:

`name` (symbol):
`'BassFigureEvent`

Name of this music object.

`types` (list):
`'(general-music event rhythmic-event bass-figure-event)`

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

### 1.1.10 BeamEvent

Start or stop a beam.

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

Event classes: Section 1.2.7 [beam-event], page 38, Section 1.2.36 [music-event], page 41, Section 1.2.58 [span-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.9 [Beam_engraver], page 221, Section 2.2.10 [Beam_performer], page 222 and Section 2.2.40 [Grace_beam_engraver], page 231.

Properties:

`name` (symbol):
`'BeamEvent`

Name of this music object.

`types` (list):
`'(general-music event beam-event span-event)`

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

### 1.1.11 BeamForbidEvent

Specify that a note may not auto-beamed.

Event classes: Section 1.2.8 [beam-forbid-event], page 39, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.4 [Auto_beam_engraver], page 219.

Properties:

`name` (symbol):
`'BeamForbidEvent`

Name of this music object.

`types` (list):
`'(general-music event beam-forbid-event)`

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

### 1.1.12 BendAfterEvent

A drop/fall/doit jazz articulation.

Event classes: Section 1.2.9 [bend-after-event], page 39, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.11 [Bend_engraver], page 222.

Properties:

`name` (symbol):
`'BendAfterEvent`

Name of this music object.

`types` (list):
`'(general-music bend-after-event event)`

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

### 1.1.13 BreakDynamicSpanEvent

End an alignment spanner for dynamics here.

Event classes: Section 1.2.10 [break-dynamic-span-event], page 39, Section 1.2.12 [break-span-event], page 39, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.27 [Dynamic_align_engraver], page 227.

Properties:

`name` (symbol):
`'BreakDynamicSpanEvent`

Name of this music object.

`types` (list):
`'(general-music break-span-event break-dynamic-span-event event)`

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

### 1.1.14 BreathingEvent

Create a 'breath mark' or 'comma'.

Syntax: *note*`\breathe`

Event classes: Section 1.2.13 [breathing-event], page 39, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.13 [Breathing_sign_engraver], page 223.

Properties:

`name` (symbol):
`'BreathingEvent`

Name of this music object.

`types` (list):
`'(general-music event breathing-event)`

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

### 1.1.15 ClusterNoteEvent

A note that is part of a cluster.

Event classes: Section 1.2.14 [cluster-note-event], page 39, Section 1.2.33 [melodic-event], page 41, Section 1.2.36 [music-event], page 41, Section 1.2.49 [rhythmic-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.17 [Cluster_spanner_engraver], page 224.

Properties:

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

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

### 1.1.16 CompletizeExtenderEvent

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

Event classes: Section 1.2.15 [completize-extender-event], page 39, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.32 [Extender_engraver], page 228.

Properties:

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

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

### 1.1.17 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):
`'(general-music translator-change-instruction)`
The types of this music object; determines by what engraver this music expression is processed.

### 1.1.18 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 general-music music-wrapper-music)`

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

### 1.1.19 CrescendoEvent

Begin or end a crescendo.

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

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

Event classes: Section 1.2.16 [crescendo-event], page 39, Section 1.2.36 [music-event], page 41, Section 1.2.57 [span-dynamic-event], page 44, Section 1.2.58 [span-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.28 [Dynamic_engraver], page 227, Section 2.2.29 [Dynamic_performer], page 228 and Section 2.2.65 [New_dynamic_engraver], page 239.

Properties:

`name` (symbol):
`'CrescendoEvent`

Name of this music object.

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

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

### 1.1.20 DecrescendoEvent

Begin or end a decrescendo.

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

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

Event classes: Section 1.2.17 [decrescendo-event], page 39, Section 1.2.36 [music-event], page 41, Section 1.2.57 [span-dynamic-event], page 44, Section 1.2.58 [span-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.28 [Dynamic_engraver], page 227, Section 2.2.29 [Dynamic_performer], page 228 and Section 2.2.65 [New_dynamic_engraver], page 239.

Properties:

`name` (symbol):
`'DecrescendoEvent`

Name of this music object.

`types` (list):
`'(general-music span-event span-dynamic-event decrescendo-event event)`

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

### 1.1.21 EpisemaEvent

Begin or end an episema.

Event classes: Section 1.2.19 [episema-event], page 40, Section 1.2.36 [music-event], page 41, Section 1.2.58 [span-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.31 [Episema_engraver], page 228.

Properties:

`name` (symbol):
`'EpisemaEvent`

Name of this music object.

`types` (list):
`'(general-music span-event event episema-event)`

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

### 1.1.22 Event

Atomic music event.

Properties:

`name` (symbol):
`'Event`

Name of this music object.

`types` (list):
`'(general-music event)`

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

### 1.1.23 EventChord

Internally used to group a set of events.

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

### 1.1.24 ExtenderEvent

Extend lyrics.

Event classes: Section 1.2.20 [extender-event], page 40, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.32 [Extender_engraver], page 228.

Properties:

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

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

### 1.1.25 FingeringEvent

Specify what finger to use for this note.

Event classes: Section 1.2.21 [fingering-event], page 40, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.35 [Fingering_engraver], page 229.

Properties:

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

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

### 1.1.26 GlissandoEvent

Start a glissando on this note.

Event classes: Section 1.2.22 [glissando-event], page 40, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.39 [Glissando_engraver], page 231.

Properties:

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

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

### 1.1.27 GraceMusic

Interpret the argument as grace notes.

Properties:

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

`length` (moment):
`#<Mom 0>`
The duration of this music.

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

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

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

### 1.1.28 HarmonicEvent

Mark a note as harmonic.

Event classes: Section 1.2.23 [harmonic-event], page 40, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Not accepted by any engraver or performer.

Properties:

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

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

### 1.1.29 HyphenEvent

A hyphen between lyric syllables.

Event classes: Section 1.2.24 [hyphen-event], page 40, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.48 [Hyphen_engraver], page 233.

Properties:

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

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

### 1.1.30 KeyChangeEvent

Change the key signature.

Syntax: `\key` *name scale*

Event classes: Section 1.2.25 [key-change-event], page 40, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.52 [Key_engraver], page 235 and Section 2.2.53 [Key_performer], page 236.

Properties:

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

`to-relative-callback` (procedure):
`#<procedure #f (x p)>`
How to transform a piece of music to relative pitches.

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

### 1.1.31 LabelEvent

Place a bookmarking label.

Event classes: Section 1.2.26 [label-event], page 40, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.75 [Paper_column_engraver], page 242.

Properties:

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

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

### 1.1.32 LaissezVibrerEvent

Don't damp this chord.

Syntax: *note*`\laissezVibrer`

Event classes: Section 1.2.27 [laissez-vibrer-event], page 40, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.54 [Laissez_vibrer_engraver], page 236.

Properties:

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

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

### 1.1.33 LigatureEvent

Start or end a ligature.

Event classes: Section 1.2.29 [ligature-event], page 41, Section 1.2.36 [music-event], page 41, Section 1.2.58 [span-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.56 [Ligature_bracket_engraver], page 236, Section 2.2.62 [Mensural_ligature_engraver], page 238 and Section 2.2.124 [Vaticana_ligature_engraver], page 257.

Properties:

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

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

### 1.1.34 LineBreakEvent

Allow, forbid or force a line break.

Event classes: Section 1.2.11 [break-event], page 39, Section 1.2.30 [line-break-event], page 41, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.74 [Page_turn_engraver], page 242 and Section 2.2.75 [Paper_column_engraver], page 242.

Properties:

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

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

### 1.1.35 LyricCombineMusic

Align lyrics to the start of notes.

Syntax: `\lyricsto` *voicename lyrics*

Properties:

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

`length` (moment):
`#<Mom 0>`
The duration of this music.

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

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

### 1.1.36 LyricEvent

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

Event classes: Section 1.2.31 [lyric-event], page 41, Section 1.2.36 [music-event], page 41, Section 1.2.49 [rhythmic-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.57 [Lyric_engraver], page 236 and Section 2.2.58 [Lyric_performer], page 237.

Properties:

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

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

### 1.1.37 MarkEvent

Insert a rehearsal mark.

Syntax: `\mark` *marker*

Example: `\mark "A"`

Event classes: Section 1.2.32 [mark-event], page 41, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.59 [Mark_engraver], page 237.

Properties:

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

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

### 1.1.38 MultiMeasureRestEvent

Used internally by `MultiMeasureRestMusic` to signal rests.

Event classes: Section 1.2.34 [multi-measure-rest-event], page 41, Section 1.2.36 [music-event], page 41, Section 1.2.49 [rhythmic-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.64 [Multi_measure_rest_engraver], page 238.

Properties:

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

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

### 1.1.39 MultiMeasureRestMusic

Rests that may be compressed into Multi 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):
`'(general-music multi-measure-rest)`
The types of this music object; determines by what engraver this music expression is processed.

### 1.1.40 MultiMeasureTextEvent

Texts on multi measure rests.

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

Note the explicit font switch.

Event classes: Section 1.2.35 [multi-measure-text-event], page 41, Section 1.2.36 [music-event], page 41 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.64 [Multi_measure_rest_engraver], page 238.

Properties:

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

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

### 1.1.41 Music

Generic type for music expressions.

Properties:

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

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

### 1.1.42 NoteEvent

A note.

Event classes: Section 1.2.33 [melodic-event], page 41, Section 1.2.36 [music-event], page 41, Section 1.2.37 [note-event], page 42, Section 1.2.49 [rhythmic-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.14 [Chord_name_engraver], page 223, Section 2.2.19 [Completion_heads_engraver], page 225, Section 2.2.25 [Drum_note_performer], page 227, Section 2.2.26 [Drum_notes_engraver], page 227, Section 2.2.38 [Fretboard_engraver], page 230, Section 2.2.68 [Note_heads_engraver], page 240, Section 2.2.69 [Note_name_engraver], page 241, Section 2.2.70 [Note_performer], page 241 and Section 2.2.110 [Tab_note_heads_engraver], page 252.

Properties:

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

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

### 1.1.43 NoteGroupingEvent

Start or stop grouping brackets.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.38 [note-grouping-event], page 42 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.47 [Horizontal_bracket_engraver], page 233.

Properties:

`name` (symbol):
`'NoteGroupingEvent`

Name of this music object.

`types` (list):
`'(general-music event note-grouping-event)`

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

### 1.1.44 OttavaMusic

Start or stop an ottava bracket.

Properties:

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

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

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

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

`name` (symbol):
`'OttavaMusic`

Name of this music object.

`types` (list):
`'(general-music ottava-music)`

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

### 1.1.45 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):
: `'(general-music layout-instruction-event override-property-event)`

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

### 1.1.46 PageBreakEvent

Allow, forbid or force a page break.

Event classes: Section 1.2.11 [break-event], page 39, Section 1.2.36 [music-event], page 41, Section 1.2.39 [page-break-event], page 42 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.74 [Page_turn_engraver], page 242 and Section 2.2.75 [Paper_column_engraver], page 242.

Properties:

`name` (symbol):
: `'PageBreakEvent`

  Name of this music object.

`types` (list):
: `'(general-music break-event page-break-event event)`

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

### 1.1.47 PageTurnEvent

Allow, forbid or force a page turn.

Event classes: Section 1.2.11 [break-event], page 39, Section 1.2.36 [music-event], page 41, Section 1.2.40 [page-turn-event], page 42 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.74 [Page_turn_engraver], page 242 and Section 2.2.75 [Paper_column_engraver], page 242.

Properties:

`name` (symbol):
: `'PageTurnEvent`

  Name of this music object.

`types` (list):
: `'(general-music break-event page-turn-event event)`

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

### 1.1.48 PartCombineForceEvent

Override the part-combiner's strategy.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.42 [part-combine-force-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Not accepted by any engraver or performer.

Properties:

`name` (symbol):
: `'PartCombineForceEvent`

  Name of this music object.

`types` (list):
`'(general-music part-combine-force-event event)`

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

### 1.1.49 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):
`'(general-music part-combine-music)`

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

### 1.1.50 PartialSet

Create an anacrusis or upbeat (partial measure).

Properties:

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

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

`name` (symbol):
`'PartialSet`

Name of this music object.

`types` (list):
`'(general-music partial-set)`

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

### 1.1.51 PercentEvent

Used internally to signal percent repeats.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.44 [percent-event], page 43, Section 1.2.49 [rhythmic-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.78 [Percent_repeat_engraver], page 243 and Section 2.2.95 [Slash_repeat_engraver], page 249.

Properties:

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

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

### 1.1.52 PercentRepeatedMusic

Repeats encoded by percents.

Properties:

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

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

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

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

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

### 1.1.53 PesOrFlexaEvent

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

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.45 [pes-or-flexa-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.124 [Vaticana_ligature_engraver], page 257.

Properties:

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

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

### 1.1.54 PhrasingSlurEvent

Start or end phrasing slur.

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

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.46 [phrasing-slur-event], page 43, Section 1.2.58 [span-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.79 [Phrasing_slur_engraver], page 244.

Properties:

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

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

### 1.1.55 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 general-music)`
The types of this music object; determines by what engraver this music expression is processed.

### 1.1.56 PropertyUnset

Restore the default setting for a context property. See Section 1.1.55 [PropertySet], page 21.

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 general-music)`

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

### 1.1.57 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):
`'(general-music music-wrapper-music)`

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

### 1.1.58 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):
`'(general-music relative-octave-check)`

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

### 1.1.59 RelativeOctaveMusic

Music that was entered in relative octave notation.

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 general-music relative-octave-music)`
The types of this music object; determines by what engraver this music expression is processed.

### 1.1.60 RepeatTieEvent

Ties for starting a second volta bracket.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.47 [repeat-tie-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.86 [Repeat_tie_engraver], page 246.

Properties:

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

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

### 1.1.61 RepeatedChord

A chord repetition

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):
`'RepeatedChord`
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:music-sequence::repeated-chord-relative-callback`
How to transform a piece of music to relative pitches.

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

### 1.1.62 RepeatedMusic

Repeat music in different ways.

Properties:

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

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

### 1.1.63 RestEvent

A Rest.

Syntax: `r4` for a quarter rest.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.48 [rest-event], page 43, Section 1.2.49 [rhythmic-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.14 [Chord_name_engraver], page 223, Section 2.2.33 [Figured_bass_engraver], page 229 and Section 2.2.88 [Rest_engraver], page 247.

Properties:

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

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

### 1.1.64 RevertProperty

The opposite of Section 1.1.45 [OverrideProperty], page 17: 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):
`'(general-music layout-instruction-event)`
The types of this music object; determines by what engraver this music expression is processed.

### 1.1.65 ScriptEvent

Add an articulation mark to a note.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.50 [script-event], page 43 and Section 1.2.60 [StreamEvent], page 45.

Not accepted by any engraver or performer.

Properties:

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

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

### 1.1.66 SequentialMusic

Music expressions concatenated.

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

Properties:

`elements-callback` (procedure):
`#<procedure #f (m)>`
Return a list of children, for use by a sequential iterator. Takes a single music parameter.

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

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

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

`name` (symbol):
`'SequentialMusic`

Name of this music object.

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

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

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

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

### 1.1.67 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):
`'(general-music simultaneous-music)`

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

### 1.1.68 SkipEvent

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

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

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.49 [rhythmic-event], page 43, Section 1.2.51 [skip-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Not accepted by any engraver or performer.

Properties:

`name` (symbol):
`'SkipEvent`

Name of this music object.

`types` (list):
`'(general-music event rhythmic-event skip-event)`

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

### 1.1.69 SkipMusic

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

Syntax: `\skip` *duration*

Properties:

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

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

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

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

`name` (symbol):
`'SkipMusic`

Name of this music object.

`types` (list):
`'(general-music event rhythmic-event skip-event)`

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

### 1.1.70 SlurEvent

Start or end slur.

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

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.52 [slur-event], page 44, Section 1.2.58 [span-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.96 [Slur_engraver], page 249 and Section 2.2.97 [Slur_performer], page 249.

Properties:

`name` (symbol):
`'SlurEvent`

Name of this music object.

`types` (list):
`'(general-music span-event event slur-event)`

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

### 1.1.71 SoloOneEvent

Print 'Solo 1'.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.41 [part-combine-event], page 42, Section 1.2.53 [solo-one-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.77 [Part_combine_engraver], page 243.

Properties:

`name` (symbol):
`'SoloOneEvent`

Name of this music object.

`part-combine-status` (symbol):
`'solo1`

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

`types` (list):
`'(general-music event part-combine-event solo-one-event)`

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

### 1.1.72 SoloTwoEvent

Print 'Solo 2'.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.41 [part-combine-event], page 42, Section 1.2.54 [solo-two-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.77 [Part_combine_engraver], page 243.

Properties:

`name` (symbol):
`'SoloTwoEvent`

Name of this music object.

`part-combine-status` (symbol):
`'solo2`

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

`types` (list):
`'(general-music event part-combine-event solo-two-event)`

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

### 1.1.73 SostenutoEvent

Depress or release sostenuto pedal.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.43 [pedal-event], page 43, Section 1.2.55 [sostenuto-event], page 44, Section 1.2.58 [span-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.81 [Piano_pedal_engraver], page 245 and Section 2.2.82 [Piano_pedal_performer], page 245.

Properties:

`name` (symbol):
`'SostenutoEvent`

Name of this music object.

`types` (list):
`'(general-music event pedal-event sostenuto-event)`

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

### 1.1.74 SpacingSectionEvent

Start a new spacing section.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.56 [spacing-section-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.98 [Spacing_engraver], page 249.

Properties:

`name` (symbol):
`'SpacingSectionEvent`

Name of this music object.

`types` (list):
`'(general-music event spacing-section-event)`

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

### 1.1.75 SpanEvent

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

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.58 [span-event], page 44 and Section 1.2.60 [StreamEvent], page 45.

Not accepted by any engraver or performer.

Properties:

`name` (symbol):
`'SpanEvent`

Name of this music object.

`types` (list):
`'(general-music event)`

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

### 1.1.76 StaffSpanEvent

Start or stop a staff symbol.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.58 [span-event], page 44, Section 1.2.59 [staff-span-event], page 45 and Section 1.2.60 [StreamEvent], page 45.

Accepted by: Section 2.2.104 [Staff_symbol_engraver], page 251.

Properties:

`name` (symbol):
`'StaffSpanEvent`

Name of this music object.

`types` (list):
`'(general-music event span-event staff-span-event)`

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

### 1.1.77 StringNumberEvent

Specify on which string to play this note.

Syntax: `\`*`number`*

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.61 [string-number-event], page 45.

Accepted by: Section 2.2.38 [Fretboard_engraver], page 230 and Section 2.2.110 [Tab_note_heads_engraver], page 252.

Properties:

`name` (symbol):
`'StringNumberEvent`

Name of this music object.

`types` (list):
`'(general-music string-number-event event)`

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

### 1.1.78 StrokeFingerEvent

Specify with which finger to pluck a string.

Syntax: `\rightHandFinger` *text*

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.62 [stroke-finger-event], page 45.

Accepted by: Section 2.2.35 [Fingering_engraver], page 229.

Properties:

`name` (symbol):
`'StrokeFingerEvent`

Name of this music object.

`types` (list):
`'(general-music stroke-finger-event event)`

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

### 1.1.79 SustainEvent

Depress or release sustain pedal.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.43 [pedal-event], page 43, Section 1.2.58 [span-event], page 44, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.63 [sustain-event], page 46.

Accepted by: Section 2.2.81 [Piano_pedal_engraver], page 245 and Section 2.2.82 [Piano_pedal_performer], page 245.

Properties:

`name` (symbol):
`'SustainEvent`

Name of this music object.

`types` (list):
`'(general-music event pedal-event sustain-event)`

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

### 1.1.80 TextScriptEvent

Print text.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.50 [script-event], page 43, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.64 [text-script-event], page 46.

Accepted by: Section 2.2.113 [Text_engraver], page 254.

Properties:

`name` (symbol):
`'TextScriptEvent`

Name of this music object.

`types` (list):
`'(general-music script-event text-script-event event)`

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

### 1.1.81 TextSpanEvent

Start a text spanner, for example, an octavation.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.58 [span-event], page 44, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.65 [text-span-event], page 46.

Accepted by: Section 2.2.114 [Text_spanner_engraver], page 254.

Properties:

`name` (symbol):
`'TextSpanEvent`

Name of this music object.

`types` (list):
`'(general-music span-event event text-span-event)`

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

### 1.1.82 TieEvent

A tie.

Syntax: *note*`-~`

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.66 [tie-event], page 46.

Accepted by: Section 2.2.19 [Completion_heads_engraver], page 225, Section 2.2.115 [Tie_engraver], page 254 and Section 2.2.116 [Tie_performer], page 254.

Properties:

`name` (symbol):
`'TieEvent`

Name of this music object.

`types` (list):
`'(general-music tie-event event)`

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

### 1.1.83 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 music-wrapper-music general-music)`

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

### 1.1.84 TimeSignatureMusic

Set a new time signature

Properties:

`elements-callback` (procedure):
`make-time-signature-set`

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

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

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

`name` (symbol):
`'TimeSignatureMusic`

Name of this music object.

`types` (list):
`'(general-music time-signature-music)`

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

### 1.1.85 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 general-music transposed-music)`

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

### 1.1.86 TremoloEvent

Unmeasured tremolo.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.67 [tremolo-event], page 46.

Accepted by: Section 2.2.107 [Stem_engraver], page 251.

Properties:

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

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

### 1.1.87 TremoloRepeatedMusic

Repeated notes denoted by tremolo beams.

Properties:

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

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

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

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

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

### 1.1.88 TremoloSpanEvent

Tremolo over two stems.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.58 [span-event], page 44, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.68 [tremolo-span-event], page 46.

Accepted by: Section 2.2.15 [Chord_tremolo_engraver], page 223.

Properties:

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

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

### 1.1.89 TrillSpanEvent

Start a trill spanner.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.58 [span-event], page 44, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.69 [trill-span-event], page 46.

Accepted by: Section 2.2.121 [Trill_spanner_engraver], page 256.

Properties:

`name` (symbol):
`'TrillSpanEvent`

Name of this music object.

`types` (list):
`'(general-music span-event event trill-span-event)`

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

### 1.1.90 TupletSpanEvent

Used internally to signal where tuplet brackets start and stop.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.58 [span-event], page 44, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.70 [tuplet-span-event], page 46.

Accepted by: Section 2.2.122 [Tuplet_engraver], page 256.

Properties:

`name` (symbol):
`'TupletSpanEvent`

Name of this music object.

`types` (list):
`'(tuplet-span-event span-event event general-music)`

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

### 1.1.91 UnaCordaEvent

Depress or release una-corda pedal.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.43 [pedal-event], page 43, Section 1.2.58 [span-event], page 44, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.71 [una-corda-event], page 46.

Accepted by: Section 2.2.81 [Piano_pedal_engraver], page 245 and Section 2.2.82 [Piano_pedal_performer], page 245.

Properties:

`name` (symbol):
`'UnaCordaEvent`

Name of this music object.

`types` (list):
`'(general-music event pedal-event una-corda-event)`

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

### 1.1.92 UnfoldedRepeatedMusic

Repeated music which is fully written (and played) out.

Properties:

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

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

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

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

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

### 1.1.93 UnisonoEvent

Print 'a 2'.

Event classes: Section 1.2.36 [music-event], page 41, Section 1.2.41 [part-combine-event], page 42, Section 1.2.60 [StreamEvent], page 45 and Section 1.2.72 [unisono-event], page 47.

Accepted by: Section 2.2.77 [Part_combine_engraver], page 243.

Properties:

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

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

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

### 1.1.94 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.

`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 general-music unrelativable-music)`

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

### 1.1.95 VoiceSeparator

Separate polyphonic voices in simultaneous music.

Syntax: `\\`

Properties:

`name` (symbol):
`'VoiceSeparator`

Name of this music object.

`types` (list):
`'(separator general-music)`

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

### 1.1.96 VoltaRepeatedMusic

Repeats with alternatives placed sequentially.

Properties:

`iterator-ctor` (procedure):
`ly:volta-repeat-iterator::constructor`

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

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

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

`name` (symbol):
`'VoltaRepeatedMusic`

Name of this music object.

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

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

`types` (list):
: `'(general-music repeated-music volta-repeated-music)`

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

## 1.2 Music classes

### 1.2.1 absolute-dynamic-event

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

Accepted by: Section 2.2.28 [Dynamic_engraver], page 227, Section 2.2.29 [Dynamic_performer], page 228 and Section 2.2.65 [New_dynamic_engraver], page 239.

### 1.2.2 annotate-output-event

Music event type `annotate-output-event` is in music objects of type Section 1.1.2 [AnnotateOutputEvent], page 2.

Accepted by: Section 2.2.6 [Balloon_engraver], page 220.

### 1.2.3 apply-output-event

Music event type `apply-output-event` is in music objects of type Section 1.1.4 [ApplyOutputEvent], page 3.

Accepted by: Section 2.2.73 [Output_property_engraver], page 242.

### 1.2.4 arpeggio-event

Music event type `arpeggio-event` is in music objects of type Section 1.1.5 [ArpeggioEvent], page 3.

Accepted by: Section 2.2.3 [Arpeggio_engraver], page 219.

### 1.2.5 articulation-event

Music event type `articulation-event` is in music objects of type Section 1.1.6 [ArticulationEvent], page 3.

Accepted by: Section 2.2.92 [Script_engraver], page 248.

### 1.2.6 bass-figure-event

Music event type `bass-figure-event` is in music objects of type Section 1.1.9 [BassFigureEvent], page 5.

Accepted by: Section 2.2.33 [Figured_bass_engraver], page 229.

### 1.2.7 beam-event

Music event type `beam-event` is in music objects of type Section 1.1.10 [BeamEvent], page 5.

Accepted by: Section 2.2.9 [Beam_engraver], page 221, Section 2.2.10 [Beam_performer], page 222 and Section 2.2.40 [Grace_beam_engraver], page 231.

### 1.2.8 beam-forbid-event

Music event type `beam-forbid-event` is in music objects of type Section 1.1.11 [BeamForbidEvent], page 5.

Accepted by: Section 2.2.4 [Auto_beam_engraver], page 219.

### 1.2.9 bend-after-event

Music event type `bend-after-event` is in music objects of type Section 1.1.12 [BendAfterEvent], page 6.

Accepted by: Section 2.2.11 [Bend_engraver], page 222.

### 1.2.10 break-dynamic-span-event

Music event type `break-dynamic-span-event` is in music objects of type Section 1.1.13 [BreakDynamicSpanEvent], page 6.

Not accepted by any engraver or performer.

### 1.2.11 break-event

Music event type `break-event` is in music objects of type Section 1.1.34 [LineBreakEvent], page 13, Section 1.1.46 [PageBreakEvent], page 18 and Section 1.1.47 [PageTurnEvent], page 18.

Accepted by: Section 2.2.74 [Page_turn_engraver], page 242 and Section 2.2.75 [Paper_column_engraver], page 242.

### 1.2.12 break-span-event

Music event type `break-span-event` is in music objects of type Section 1.1.13 [BreakDynamicSpanEvent], page 6.

Accepted by: Section 2.2.27 [Dynamic_align_engraver], page 227.

### 1.2.13 breathing-event

Music event type `breathing-event` is in music objects of type Section 1.1.14 [BreathingEvent], page 6.

Accepted by: Section 2.2.13 [Breathing_sign_engraver], page 223.

### 1.2.14 cluster-note-event

Music event type `cluster-note-event` is in music objects of type Section 1.1.15 [ClusterNoteEvent], page 7.

Accepted by: Section 2.2.17 [Cluster_spanner_engraver], page 224.

### 1.2.15 completize-extender-event

Music event type `completize-extender-event` is in music objects of type Section 1.1.16 [CompletizeExtenderEvent], page 7.

Accepted by: Section 2.2.32 [Extender_engraver], page 228.

### 1.2.16 crescendo-event

Music event type `crescendo-event` is in music objects of type Section 1.1.19 [CrescendoEvent], page 8.

Accepted by: Section 2.2.29 [Dynamic_performer], page 228.

### 1.2.17 decrescendo-event

Music event type `decrescendo-event` is in music objects of type Section 1.1.20 [DecrescendoEvent], page 9.

Accepted by: Section 2.2.29 [Dynamic_performer], page 228.

### 1.2.18 dynamic-event

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

Not accepted by any engraver or performer.

### 1.2.19 episema-event

Music event type `episema-event` is in music objects of type Section 1.1.21 [EpisemaEvent], page 9.

Accepted by: Section 2.2.31 [Episema_engraver], page 228.

### 1.2.20 extender-event

Music event type `extender-event` is in music objects of type Section 1.1.24 [ExtenderEvent], page 10.

Accepted by: Section 2.2.32 [Extender_engraver], page 228.

### 1.2.21 fingering-event

Music event type `fingering-event` is in music objects of type Section 1.1.25 [FingeringEvent], page 10.

Accepted by: Section 2.2.35 [Fingering_engraver], page 229.

### 1.2.22 glissando-event

Music event type `glissando-event` is in music objects of type Section 1.1.26 [GlissandoEvent], page 11.

Accepted by: Section 2.2.39 [Glissando_engraver], page 231.

### 1.2.23 harmonic-event

Music event type `harmonic-event` is in music objects of type Section 1.1.28 [HarmonicEvent], page 11.

Not accepted by any engraver or performer.

### 1.2.24 hyphen-event

Music event type `hyphen-event` is in music objects of type Section 1.1.29 [HyphenEvent], page 12.

Accepted by: Section 2.2.48 [Hyphen_engraver], page 233.

### 1.2.25 key-change-event

Music event type `key-change-event` is in music objects of type Section 1.1.30 [KeyChangeEvent], page 12.

Accepted by: Section 2.2.52 [Key_engraver], page 235 and Section 2.2.53 [Key_performer], page 236.

### 1.2.26 label-event

Music event type `label-event` is in music objects of type Section 1.1.31 [LabelEvent], page 12.

Accepted by: Section 2.2.75 [Paper_column_engraver], page 242.

### 1.2.27 laissez-vibrer-event

Music event type `laissez-vibrer-event` is in music objects of type Section 1.1.32 [LaissezVibrerEvent], page 13.

Accepted by: Section 2.2.54 [Laissez_vibrer_engraver], page 236.

### 1.2.28 layout-instruction-event

Music event type `layout-instruction-event` is in music objects of type Section 1.1.4 [ApplyOutputEvent], page 3.

Not accepted by any engraver or performer.

### 1.2.29 ligature-event

Music event type `ligature-event` is in music objects of type Section 1.1.33 [LigatureEvent], page 13.

Accepted by: Section 2.2.56 [Ligature_bracket_engraver], page 236, Section 2.2.62 [Mensural_ligature_engraver], page 238 and Section 2.2.124 [Vaticana_ligature_engraver], page 257.

### 1.2.30 line-break-event

Music event type `line-break-event` is in music objects of type Section 1.1.34 [LineBreakEvent], page 13.

Not accepted by any engraver or performer.

### 1.2.31 lyric-event

Music event type `lyric-event` is in music objects of type Section 1.1.36 [LyricEvent], page 14.

Accepted by: Section 2.2.57 [Lyric_engraver], page 236 and Section 2.2.58 [Lyric_performer], page 237.

### 1.2.32 mark-event

Music event type `mark-event` is in music objects of type Section 1.1.37 [MarkEvent], page 14.

Accepted by: Section 2.2.59 [Mark_engraver], page 237.

### 1.2.33 melodic-event

Music event type `melodic-event` is in music objects of type Section 1.1.15 [ClusterNoteEvent], page 7 and Section 1.1.42 [NoteEvent], page 16.

Not accepted by any engraver or performer.

### 1.2.34 multi-measure-rest-event

Music event type `multi-measure-rest-event` is in music objects of type Section 1.1.38 [MultiMeasureRestEvent], page 15.

Accepted by: Section 2.2.64 [Multi_measure_rest_engraver], page 238.

### 1.2.35 multi-measure-text-event

Music event type `multi-measure-text-event` is in music objects of type Section 1.1.40 [MultiMeasureTextEvent], page 16.

Accepted by: Section 2.2.64 [Multi_measure_rest_engraver], page 238.

### 1.2.36 music-event

Music event type `music-event` is in music objects of type Section 1.1.1 [AbsoluteDynamicEvent], page 2, Section 1.1.2 [AnnotateOutputEvent], page 2, Section 1.1.4 [ApplyOutputEvent], page 3, Section 1.1.5 [ArpeggioEvent], page 3, Section 1.1.6 [ArticulationEvent], page 3, Section 1.1.9 [BassFigureEvent], page 5, Section 1.1.10 [BeamEvent], page 5, Section 1.1.11 [BeamForbidEvent], page 5, Section 1.1.12 [BendAfterEvent], page 6, Section 1.1.13 [BreakDynamicSpanEvent], page 6, Section 1.1.14 [BreathingEvent], page 6, Section 1.1.15 [ClusterNoteEvent], page 7, Section 1.1.16 [CompletizeExtenderEvent], page 7, Section 1.1.19 [CrescendoEvent], page 8, Section 1.1.20 [DecrescendoEvent],

page 9, Section 1.1.21 [EpisemaEvent], page 9, Section 1.1.24 [ExtenderEvent], page 10, Section 1.1.25 [FingeringEvent], page 10, Section 1.1.26 [GlissandoEvent], page 11, Section 1.1.28 [HarmonicEvent], page 11, Section 1.1.29 [HyphenEvent], page 12, Section 1.1.30 [KeyChangeEvent], page 12, Section 1.1.31 [LabelEvent], page 12, Section 1.1.32 [LaissezVibrerEvent], page 13, Section 1.1.33 [LigatureEvent], page 13, Section 1.1.34 [LineBreakEvent], page 13, Section 1.1.36 [LyricEvent], page 14, Section 1.1.37 [MarkEvent], page 14, Section 1.1.38 [MultiMeasureRestEvent], page 15, Section 1.1.40 [MultiMeasureTextEvent], page 16, Section 1.1.42 [NoteEvent], page 16, Section 1.1.43 [NoteGroupingEvent], page 17, Section 1.1.46 [PageBreakEvent], page 18, Section 1.1.47 [PageTurnEvent], page 18, Section 1.1.48 [PartCombineForceEvent], page 18, Section 1.1.51 [PercentEvent], page 20, Section 1.1.53 [PesOrFlexaEvent], page 20, Section 1.1.54 [PhrasingSlurEvent], page 21, Section 1.1.60 [RepeatTieEvent], page 23, Section 1.1.63 [RestEvent], page 24, Section 1.1.65 [ScriptEvent], page 25, Section 1.1.68 [SkipEvent], page 27, Section 1.1.70 [SlurEvent], page 27, Section 1.1.71 [SoloOneEvent], page 28, Section 1.1.72 [SoloTwoEvent], page 28, Section 1.1.73 [SostenutoEvent], page 29, Section 1.1.74 [SpacingSectionEvent], page 29, Section 1.1.75 [SpanEvent], page 29, Section 1.1.76 [StaffSpanEvent], page 30, Section 1.1.77 [StringNumberEvent], page 30, Section 1.1.78 [StrokeFingerEvent], page 30, Section 1.1.79 [SustainEvent], page 31, Section 1.1.80 [TextScriptEvent], page 31, Section 1.1.81 [TextSpanEvent], page 31, Section 1.1.82 [TieEvent], page 32, Section 1.1.86 [TremoloEvent], page 33, Section 1.1.88 [TremoloSpanEvent], page 34, Section 1.1.89 [TrillSpanEvent], page 35, Section 1.1.90 [TupletSpanEvent], page 35, Section 1.1.91 [UnaCordaEvent], page 35 and Section 1.1.93 [UnisonoEvent], page 36.

Not accepted by any engraver or performer.

### 1.2.37 note-event

Music event type `note-event` is in music objects of type Section 1.1.42 [NoteEvent], page 16.

Accepted by: Section 2.2.14 [Chord_name_engraver], page 223, Section 2.2.19 [Completion_heads_engraver], page 225, Section 2.2.25 [Drum_note_performer], page 227, Section 2.2.26 [Drum_notes_engraver], page 227, Section 2.2.38 [Fretboard_engraver], page 230, Section 2.2.68 [Note_heads_engraver], page 240, Section 2.2.69 [Note_name_engraver], page 241, Section 2.2.70 [Note_performer], page 241 and Section 2.2.110 [Tab_note_heads_engraver], page 252.

### 1.2.38 note-grouping-event

Music event type `note-grouping-event` is in music objects of type Section 1.1.43 [NoteGroupingEvent], page 17.

Accepted by: Section 2.2.47 [Horizontal_bracket_engraver], page 233.

### 1.2.39 page-break-event

Music event type `page-break-event` is in music objects of type Section 1.1.46 [PageBreakEvent], page 18.

Not accepted by any engraver or performer.

### 1.2.40 page-turn-event

Music event type `page-turn-event` is in music objects of type Section 1.1.47 [PageTurnEvent], page 18.

Not accepted by any engraver or performer.

### 1.2.41 part-combine-event

Music event type `part-combine-event` is in music objects of type Section 1.1.71 [SoloOneEvent], page 28, Section 1.1.72 [SoloTwoEvent], page 28 and Section 1.1.93 [UnisonoEvent], page 36.

Accepted by: Section 2.2.77 [Part_combine_engraver], page 243.

### 1.2.42 part-combine-force-event

Music event type `part-combine-force-event` is in music objects of type Section 1.1.48 [PartCombineForceEvent], page 18.

Not accepted by any engraver or performer.

### 1.2.43 pedal-event

Music event type `pedal-event` is in music objects of type Section 1.1.73 [SostenutoEvent], page 29, Section 1.1.79 [SustainEvent], page 31 and Section 1.1.91 [UnaCordaEvent], page 35.

Not accepted by any engraver or performer.

### 1.2.44 percent-event

Music event type `percent-event` is in music objects of type Section 1.1.51 [PercentEvent], page 20.

Accepted by: Section 2.2.78 [Percent_repeat_engraver], page 243 and Section 2.2.95 [Slash_repeat_engraver], page 249.

### 1.2.45 pes-or-flexa-event

Music event type `pes-or-flexa-event` is in music objects of type Section 1.1.53 [PesOrFlexaEvent], page 20.

Accepted by: Section 2.2.124 [Vaticana_ligature_engraver], page 257.

### 1.2.46 phrasing-slur-event

Music event type `phrasing-slur-event` is in music objects of type Section 1.1.54 [PhrasingSlurEvent], page 21.

Accepted by: Section 2.2.79 [Phrasing_slur_engraver], page 244.

### 1.2.47 repeat-tie-event

Music event type `repeat-tie-event` is in music objects of type Section 1.1.60 [RepeatTieEvent], page 23.

Accepted by: Section 2.2.86 [Repeat_tie_engraver], page 246.

### 1.2.48 rest-event

Music event type `rest-event` is in music objects of type Section 1.1.63 [RestEvent], page 24.

Accepted by: Section 2.2.14 [Chord_name_engraver], page 223, Section 2.2.33 [Figured_bass_engraver], page 229 and Section 2.2.88 [Rest_engraver], page 247.

### 1.2.49 rhythmic-event

Music event type `rhythmic-event` is in music objects of type Section 1.1.9 [BassFigureEvent], page 5, Section 1.1.15 [ClusterNoteEvent], page 7, Section 1.1.36 [LyricEvent], page 14, Section 1.1.38 [MultiMeasureRestEvent], page 15, Section 1.1.42 [NoteEvent], page 16, Section 1.1.51 [PercentEvent], page 20, Section 1.1.63 [RestEvent], page 24 and Section 1.1.68 [SkipEvent], page 27.

Not accepted by any engraver or performer.

### 1.2.50 script-event

Music event type `script-event` is in music objects of type Section 1.1.6 [ArticulationEvent], page 3, Section 1.1.65 [ScriptEvent], page 25 and Section 1.1.80 [TextScriptEvent], page 31.

Not accepted by any engraver or performer.

### 1.2.51 skip-event

Music event type `skip-event` is in music objects of type Section 1.1.68 [SkipEvent], page 27.

Not accepted by any engraver or performer.

### 1.2.52 slur-event

Music event type `slur-event` is in music objects of type Section 1.1.70 [SlurEvent], page 27.

Accepted by: Section 2.2.96 [Slur_engraver], page 249 and Section 2.2.97 [Slur_performer], page 249.

### 1.2.53 solo-one-event

Music event type `solo-one-event` is in music objects of type Section 1.1.71 [SoloOneEvent], page 28.

Not accepted by any engraver or performer.

### 1.2.54 solo-two-event

Music event type `solo-two-event` is in music objects of type Section 1.1.72 [SoloTwoEvent], page 28.

Not accepted by any engraver or performer.

### 1.2.55 sostenuto-event

Music event type `sostenuto-event` is in music objects of type Section 1.1.73 [SostenutoEvent], page 29.

Accepted by: Section 2.2.81 [Piano_pedal_engraver], page 245 and Section 2.2.82 [Piano_pedal_performer], page 245.

### 1.2.56 spacing-section-event

Music event type `spacing-section-event` is in music objects of type Section 1.1.74 [SpacingSectionEvent], page 29.

Accepted by: Section 2.2.98 [Spacing_engraver], page 249.

### 1.2.57 span-dynamic-event

Music event type `span-dynamic-event` is in music objects of type Section 1.1.19 [CrescendoEvent], page 8 and Section 1.1.20 [DecrescendoEvent], page 9.

Accepted by: Section 2.2.28 [Dynamic_engraver], page 227 and Section 2.2.65 [New_dynamic_engraver], page 239.

### 1.2.58 span-event

Music event type `span-event` is in music objects of type Section 1.1.10 [BeamEvent], page 5, Section 1.1.19 [CrescendoEvent], page 8, Section 1.1.20 [DecrescendoEvent], page 9, Section 1.1.21 [EpisemaEvent], page 9, Section 1.1.33 [LigatureEvent], page 13, Section 1.1.54 [PhrasingSlurEvent], page 21, Section 1.1.70 [SlurEvent], page 27, Section 1.1.73 [SostenutoEvent], page 29, Section 1.1.75 [SpanEvent], page 29, Section 1.1.76 [StaffSpanEvent], page 30, Section 1.1.79 [SustainEvent], page 31, Section 1.1.81 [TextSpanEvent], page 31, Section 1.1.88 [TremoloSpanEvent], page 34, Section 1.1.89 [TrillSpanEvent], page 35, Section 1.1.90 [TupletSpanEvent], page 35 and Section 1.1.91 [UnaCordaEvent], page 35.

Not accepted by any engraver or performer.

### 1.2.59 staff-span-event

Music event type `staff-span-event` is in music objects of type Section 1.1.76 [StaffSpanEvent], page 30.

Accepted by: Section 2.2.104 [Staff_symbol_engraver], page 251.

### 1.2.60 StreamEvent

Music event type `StreamEvent` is in music objects of type Section 1.1.1 [AbsoluteDynamicEvent], page 2, Section 1.1.2 [AnnotateOutputEvent], page 2, Section 1.1.4 [ApplyOutputEvent], page 3, Section 1.1.5 [ArpeggioEvent], page 3, Section 1.1.6 [ArticulationEvent], page 3, Section 1.1.9 [BassFigureEvent], page 5, Section 1.1.10 [BeamEvent], page 5, Section 1.1.11 [BeamForbidEvent], page 5, Section 1.1.12 [BendAfterEvent], page 6, Section 1.1.13 [BreakDynamicSpanEvent], page 6, Section 1.1.14 [BreathingEvent], page 6, Section 1.1.15 [ClusterNoteEvent], page 7, Section 1.1.16 [CompletizeExtenderEvent], page 7, Section 1.1.19 [CrescendoEvent], page 8, Section 1.1.20 [DecrescendoEvent], page 9, Section 1.1.21 [EpisemaEvent], page 9, Section 1.1.24 [ExtenderEvent], page 10, Section 1.1.25 [FingeringEvent], page 10, Section 1.1.26 [GlissandoEvent], page 11, Section 1.1.28 [HarmonicEvent], page 11, Section 1.1.29 [HyphenEvent], page 12, Section 1.1.30 [KeyChangeEvent], page 12, Section 1.1.31 [LabelEvent], page 12, Section 1.1.32 [LaissezVibrerEvent], page 13, Section 1.1.33 [LigatureEvent], page 13, Section 1.1.34 [LineBreakEvent], page 13, Section 1.1.36 [LyricEvent], page 14, Section 1.1.37 [MarkEvent], page 14, Section 1.1.38 [MultiMeasureRestEvent], page 15, Section 1.1.40 [MultiMeasureTextEvent], page 16, Section 1.1.42 [NoteEvent], page 16, Section 1.1.43 [NoteGroupingEvent], page 17, Section 1.1.46 [PageBreakEvent], page 18, Section 1.1.47 [PageTurnEvent], page 18, Section 1.1.48 [PartCombineForceEvent], page 18, Section 1.1.51 [PercentEvent], page 20, Section 1.1.53 [PesOrFlexaEvent], page 20, Section 1.1.54 [PhrasingSlurEvent], page 21, Section 1.1.60 [RepeatTieEvent], page 23, Section 1.1.63 [RestEvent], page 24, Section 1.1.65 [ScriptEvent], page 25, Section 1.1.68 [SkipEvent], page 27, Section 1.1.70 [SlurEvent], page 27, Section 1.1.71 [SoloOneEvent], page 28, Section 1.1.72 [SoloTwoEvent], page 28, Section 1.1.73 [SostenutoEvent], page 29, Section 1.1.74 [SpacingSectionEvent], page 29, Section 1.1.75 [SpanEvent], page 29, Section 1.1.76 [StaffSpanEvent], page 30, Section 1.1.77 [StringNumberEvent], page 30, Section 1.1.78 [StrokeFingerEvent], page 30, Section 1.1.79 [SustainEvent], page 31, Section 1.1.80 [TextScriptEvent], page 31, Section 1.1.81 [TextSpanEvent], page 31, Section 1.1.82 [TieEvent], page 32, Section 1.1.86 [TremoloEvent], page 33, Section 1.1.88 [TremoloSpanEvent], page 34, Section 1.1.89 [TrillSpanEvent], page 35, Section 1.1.90 [TupletSpanEvent], page 35, Section 1.1.91 [UnaCordaEvent], page 35 and Section 1.1.93 [UnisonoEvent], page 36.

Not accepted by any engraver or performer.

### 1.2.61 string-number-event

Music event type `string-number-event` is in music objects of type Section 1.1.77 [StringNumberEvent], page 30.

Accepted by: Section 2.2.38 [Fretboard_engraver], page 230 and Section 2.2.110 [Tab_note_heads_engraver], page 252.

### 1.2.62 stroke-finger-event

Music event type `stroke-finger-event` is in music objects of type Section 1.1.78 [StrokeFingerEvent], page 30.

Accepted by: Section 2.2.35 [Fingering_engraver], page 229.

### 1.2.63 sustain-event

Music event type `sustain-event` is in music objects of type Section 1.1.79 [SustainEvent], page 31.

Accepted by: Section 2.2.81 [Piano_pedal_engraver], page 245 and Section 2.2.82 [Piano_pedal_performer], page 245.

### 1.2.64 text-script-event

Music event type `text-script-event` is in music objects of type Section 1.1.80 [TextScriptEvent], page 31.

Accepted by: Section 2.2.113 [Text_engraver], page 254.

### 1.2.65 text-span-event

Music event type `text-span-event` is in music objects of type Section 1.1.81 [TextSpanEvent], page 31.

Accepted by: Section 2.2.114 [Text_spanner_engraver], page 254.

### 1.2.66 tie-event

Music event type `tie-event` is in music objects of type Section 1.1.82 [TieEvent], page 32.

Accepted by: Section 2.2.19 [Completion_heads_engraver], page 225, Section 2.2.115 [Tie_engraver], page 254 and Section 2.2.116 [Tie_performer], page 254.

### 1.2.67 tremolo-event

Music event type `tremolo-event` is in music objects of type Section 1.1.86 [TremoloEvent], page 33.

Accepted by: Section 2.2.107 [Stem_engraver], page 251.

### 1.2.68 tremolo-span-event

Music event type `tremolo-span-event` is in music objects of type Section 1.1.88 [TremoloSpanEvent], page 34.

Accepted by: Section 2.2.15 [Chord_tremolo_engraver], page 223.

### 1.2.69 trill-span-event

Music event type `trill-span-event` is in music objects of type Section 1.1.89 [TrillSpanEvent], page 35.

Accepted by: Section 2.2.121 [Trill_spanner_engraver], page 256.

### 1.2.70 tuplet-span-event

Music event type `tuplet-span-event` is in music objects of type Section 1.1.90 [TupletSpanEvent], page 35.

Accepted by: Section 2.2.122 [Tuplet_engraver], page 256.

### 1.2.71 una-corda-event

Music event type `una-corda-event` is in music objects of type Section 1.1.91 [UnaCordaEvent], page 35.

Accepted by: Section 2.2.81 [Piano_pedal_engraver], page 245 and Section 2.2.82 [Piano_pedal_performer], page 245.

### 1.2.72 unisono-event

Music event type `unisono-event` is in music objects of type Section 1.1.93 [UnisonoEvent], page 36.

Not accepted by any engraver or performer.

## 1.3 Music properties

`absolute-octave` (integer)
: The absolute octave for a octave check note.

`alteration` (number)
: Alteration for figured bass.

`articulation-type` (string)
: Key for script definitions alist.

  TODO: Consider making type into symbol.

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

`associated-context` (string)
: Name of the Voice 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).

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

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

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

  TODO: Use SpanEvents?

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

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

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

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

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

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

`compress-procedure` (procedure)
: Compress this music expression. Arg 1: the music, arg 2: factor.

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

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

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

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

`denominator` (integer)
: Denominator in a time signature.

`descend-only` (boolean)
: If set, this `\context` only descends in the context tree.

`digit` (integer)
: Digit for fingering.

`diminished` (boolean)
: This bass figure should be slashed.

`direction` (direction)
: Print this up or down?

`drum-type` (symbol)
: Which percussion instrument to play this note on.

`duration` (duration)
: Duration of this note or lyric.

`element` (music)
: The single child of a Music_wrapper music object, or the body of a repeat.

`elements` (list of music objects)
: A list of elements for sequential of simultaneous music, or the alternatives of repeated music.

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

`error-found` (boolean)
: If true, a parsing error was found in this expression.

`figure` (integer)
: A bass figure.

`force-accidental` (boolean)
: If set, a cautionary accidental should always be printed on this note.

`forced-type` (symbol)
: Override for the part-combiner.

`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.

`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` (markup)
: Label of a mark.

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

`length` (moment)
: The duration of this music.

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

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

`metronome-count` (number)
: How many beats in a minute?

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

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

`numerator` (integer)
: Numerator of a time signature.

`octavation` (integer)
: This pitch was octavated by how many octaves? For chord inversions, this is negative.

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

`origin` (input location)
: Where was this piece of music defined?

`original-chord` (music)
: Original chord of a repeated chord. Used by repeated chords in \relative mode, to determine the first note octave

`ottava-number` (integer)
: The octavation for `\ottava`.

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

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

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

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

`parenthesize` (boolean)
: Enclose resulting objects in parentheses?

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

`partial-duration` (duration)
: The length of a partial measure as a duration.

`pitch` (pitch)
: The pitch of this note.

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

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

`prob-property` (symbol)
: The symbol of the prob property to set.

`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.

`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-name` (string)
: The name of the voice to quote.

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

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

`repeat-count` (integer)
: Do a `\repeat` how often?

`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`.

`split-list` (list)
: Splitting moments for part combiner.

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

`string-number` (integer)
: The number of the string in a `StringNumberEvent`.

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

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

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

`text` (markup)
: Markup expression to be printed.

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

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

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

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

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

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

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

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

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

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

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

  FIXME: Naming.

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

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

# 2 Translation

## 2.1 Contexts

### 2.1.1 ChoirStaff

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

This context creates the following layout object(s):

Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357, Section 3.1.109 [SystemStartSquare], page 358 and Section 3.1.125 [VerticalAlignment], page 373.

This context sets the following properties:

- Set translator property `shortVocalName` to `'()`.
- Set translator property `systemStartDelimiter` to `'SystemStartBracket`.
- Set translator property `topLevelAlignment` to `#f`.
- Set translator property `vocalName` to `'()`.

Context ChoirStaff can contain Section 2.1.1 [ChoirStaff], page 52, Section 2.1.2 [ChordNames], page 53, Section 2.1.5 [DrumStaff], page 67, Section 2.1.8 [FiguredBass], page 86, Section 2.1.11 [GrandStaff], page 90, Section 2.1.14 [Lyrics], page 113, Section 2.1.18 [PianoStaff], page 138, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155 and Section 2.1.22 [StaffGroup], page 164.

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

`Section 2.2.108 [System_start_delimiter_engraver], page 252`
: Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

  Properties (read)

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

  `systemStartDelimiter` (symbol)
  : Which grob to make for the start of the system/staff? Set to `SystemStartBrace`, `SystemStartBracket` or `SystemStartBar`.

  `systemStartDelimiterHierarchy` (pair)
  : A nested list, indicating the nesting of a start delimiters.

  This engraver creates the following layout object(s):

  Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357 and Section 3.1.109 [SystemStartSquare], page 358.

`Section 2.2.125 [Vertical_align_engraver], page 257`
: 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.

This engraver creates the following layout object(s):

Section 3.1.125 [VerticalAlignment], page 373.

### 2.1.2 ChordNames

Typesets chord names.

This context creates the following layout object(s):

Section 3.1.24 [ChordName], page 287, Section 3.1.96 [StaffSpacing], page 347 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set grob-property `nonstaff-nonstaff-spacing padding` in Section 3.1.126 [VerticalAxisGroup], page 373 to `0.5`.
- Set grob-property `nonstaff-relatedstaff-spacing padding` in Section 3.1.126 [VerticalAxisGroup], page 373 to `0.5`.
- Set grob-property `remove-empty` in Section 3.1.126 [VerticalAxisGroup], page 373 to `#t`.
- Set grob-property `remove-first` in Section 3.1.126 [VerticalAxisGroup], page 373 to `#t`.
- Set grob-property `staff-affinity` in Section 3.1.126 [VerticalAxisGroup], page 373 to `-1`.

This context is a 'bottom' context; it cannot contain other contexts.

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

`Section 2.2.14 [Chord_name_engraver], page 223`
: Catch note and rest events and generate the appropriate chordname.

Music types accepted:

Section 1.2.37 [note-event], page 42 and Section 1.2.48 [rest-event], page 43

Properties (read)

`chordChanges` (boolean)
: Only show changes in chords scheme?

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

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

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

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

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

`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.

This engraver creates the following layout object(s):

Section 3.1.24 [ChordName], page 287.

Section 2.2.46 [Hara_kiri_engraver], page 233
: Like `Axis_group_engraver`, but make a hara-kiri spanner, and add interesting items (i.e., note heads, lyric syllables, and normal rests).

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.73 [Output_property_engraver], page 242
: Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

Section 2.2.94 [Separating_line_group_engraver], page 248
: Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.96 [StaffSpacing], page 347.

### 2.1.3 CueVoice

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

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

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

Voice.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276, Section 3.1.19 [Beam], page 283, Section 3.1.20 [BendAfter], page 285, Section 3.1.23 [BreathingSign], page 287, Section 3.1.26 [ClusterSpanner], page 289, Section 3.1.27 [ClusterSpannerBeacon], page 290, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.31 [Dots], page 293, Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.38 [Fingering], page 300, Section 3.1.40 [Glissando], page 303, Section 3.1.44 [Hairpin], page 305, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.51 [LaissezVibrerTie], page 312, Section 3.1.52 [LaissezVibrerTieColumn], page 313, Section 3.1.55 [LigatureBracket], page 314, Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.69 [NoteColumn], page 326, Section 3.1.70 [NoteHead], page 326, Section 3.1.72 [NoteSpacing], page 327, Section 3.1.77 [PercentRepeat], page 331, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.79 [PhrasingSlur], page 333, Section 3.1.82 [RepeatSlash], page 337, Section 3.1.83 [RepeatTie], page 337, Section 3.1.84 [RepeatTieColumn], page 338, Section 3.1.85 [Rest], page 339, Section 3.1.87 [Script], page 339, Section 3.1.88 [ScriptColumn], page 340, Section 3.1.90 [Slur], page 341, Section 3.1.99 [Stem], page 348, Section 3.1.100 [StemTremolo], page 350, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352, Section 3.1.111 [TextScript], page 360, Section 3.1.112 [TextSpanner], page 361, Section 3.1.113 [Tie], page 362, Section 3.1.114 [TieColumn], page 364, Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.118 [TrillPitchHead], page 367, Section 3.1.119 [TrillSpanner], page 368, Section 3.1.120 [TupletBracket], page 369, Section 3.1.121 [TupletNumber], page 370 and Section 3.1.127 [VoiceFollower], page 375.

This context sets the following properties:

- Set grob-property `beam-thickness` in Section 3.1.19 [Beam], page 283 to `0.35`.
- Set grob-property `length-fraction` in Section 3.1.19 [Beam], page 283 to `0.629960524947437`.
- Set grob-property `length-fraction` in Section 3.1.99 [Stem], page 348 to `0.629960524947437`.
- Set translator property `fontSize` to `-4`.
- Set translator property `localKeySignature` to `'()`.

This context is a 'bottom' context; it cannot contain other contexts.

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

`Section 2.2.3 [Arpeggio_engraver], page 219`
: Generate an Arpeggio symbol.

  Music types accepted:

  Section 1.2.4 [arpeggio-event], page 38

  This engraver creates the following layout object(s):

  Section 3.1.9 [Arpeggio], page 276.

`Section 2.2.4 [Auto_beam_engraver], page 219`
: Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.107 [Stem_engraver], page 251 properties `stemLeftBeamCount` and `stemRightBeamCount`.

  Music types accepted:

Section 1.2.8 [beam-forbid-event], page 39

Properties (read)

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

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.9 [Beam_engraver], page 221

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

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.11 [Bend_engraver], page 222
Create fall spanners.

Music types accepted:

Section 1.2.9 [bend-after-event], page 39

This engraver creates the following layout object(s):

Section 3.1.20 [BendAfter], page 285.

Section 2.2.13 [Breathing_sign_engraver], page 223
Create a breathing sign.

Music types accepted:

Section 1.2.13 [breathing-event], page 39

This engraver creates the following layout object(s):

Section 3.1.23 [BreathingSign], page 287.

Section 2.2.15 [Chord_tremolo_engraver], page 223
Generate beams for tremolo repeats.

Music types accepted:

Section 1.2.68 [tremolo-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.17 [Cluster_spanner_engraver], page 224
Engrave a cluster using `Spanner` notation.

Music types accepted:

Section 1.2.14 [cluster-note-event], page 39

This engraver creates the following layout object(s):

Section 3.1.26 [ClusterSpanner], page 289 and Section 3.1.27 [ClusterSpannerBeacon], page 290.

Section 2.2.24 [Dots_engraver], page 226
Create Section 3.1.31 [Dots], page 293 objects for Section 3.2.82 [rhythmic-head-interface], page 419s.

This engraver creates the following layout object(s):

Section 3.1.31 [Dots], page 293.

Section 2.2.27 [Dynamic_align_engraver], page 227
Align hairpins and dynamic texts on a horizontal line.

Music types accepted:

Section 1.2.12 [break-span-event], page 39

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.34 [DynamicLineSpanner], page 296.

Section 2.2.35 [Fingering_engraver], page 229
Create fingering scripts.

Music types accepted:

Section 1.2.21 [fingering-event], page 40 and Section 1.2.62 [stroke-finger-event], page 45

This engraver creates the following layout object(s):

Section 3.1.38 [Fingering], page 300.

Section 2.2.36 [Font_size_engraver], page 230

Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.37 [Forbid_line_break_engraver], page 230

Forbid line breaks when note heads are still playing at some point.

Properties (read)

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

Properties (write)

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

Section 2.2.39 [Glissando_engraver], page 231

Engrave glissandi.

Music types accepted:

Section 1.2.22 [glissando-event], page 40

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303.

Section 2.2.40 [Grace_beam_engraver], page 231

Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.41 [Grace_engraver], page 232
Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

Section 2.2.45 [Grob_pq_engraver], page 233
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.50 [Instrument_switch_engraver], page 234
Create a cue text for taking instrument.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.48 [InstrumentSwitch], page 309.

Section 2.2.54 [Laissez_vibrer_engraver], page 236
Create laissez vibrer items.

Music types accepted:

Section 1.2.27 [laissez-vibrer-event], page 40

This engraver creates the following layout object(s):

Section 3.1.51 [LaissezVibrerTie], page 312 and Section 3.1.52 [LaissezVibrerTieColumn], page 313.

Section 2.2.56 [Ligature_bracket_engraver], page 236
Handle `Ligature_events` by engraving `Ligature` brackets.

Music types accepted:

Section 1.2.29 [ligature-event], page 41

This engraver creates the following layout object(s):

Section 3.1.55 [LigatureBracket], page 314.

Section 2.2.64 [Multi_measure_rest_engraver], page 238
: Engrave multi-measure rests that are produced with 'R'. It reads `measurePosition` and `internalBarNumber` to determine what number to print over the Section 3.1.64 [MultiMeasureRest], page 321. Reads `measureLength` to determine whether it should use a whole rest or a breve rest to represent one measure.

  Music types accepted:

  Section 1.2.34 [multi-measure-rest-event], page 41 and Section 1.2.35 [multi-measure-text-event], page 41

  Properties (read)

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

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

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

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

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

  This engraver creates the following layout object(s):

  Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322 and Section 3.1.66 [MultiMeasureRestText], page 323.

Section 2.2.65 [New_dynamic_engraver], page 239
: Create hairpins, dynamic texts and dynamic text spanners.

  Music types accepted:

  Section 1.2.1 [absolute-dynamic-event], page 38 and Section 1.2.57 [span-dynamic-event], page 44

  Properties (read)

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

  `crescendoText` (markup)
  : The text to print at start of non-hairpin crescendo, i.e., '`cresc.`'.

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

`decrescendoSpanner` (symbol)
: The type of spanner to be used for decrescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin decrescendo is used.

`decrescendoText` (markup)
: The text to print at start of non-hairpin decrescendo, i.e., '`dim.`'.

This engraver creates the following layout object(s):

Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298 and Section 3.1.44 [Hairpin], page 305.

Section 2.2.66 [New_fingering_engraver], page 240
: Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

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

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

`stringNumberOrientations` (list)
: See `fingeringOrientations`.

`strokeFingerOrientations` (list)
: See `fingeringOrientations`.

This engraver creates the following layout object(s):

Section 3.1.38 [Fingering], page 300, Section 3.1.87 [Script], page 339, Section 3.1.101 [StringNumber], page 351 and Section 3.1.102 [StrokeFinger], page 352.

Section 2.2.67 [Note_head_line_engraver], page 240
: Engrave a line between two note heads, for example a glissando. If `followVoice` is set, staff switches also generate a line.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303 and Section 3.1.127 [VoiceFollower], page 375.

Section 2.2.68 [Note_heads_engraver], page 240
Generate note heads.

Music types accepted:

Section 1.2.37 [note-event], page 42

Properties (read)

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

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

This engraver creates the following layout object(s):

Section 3.1.70 [NoteHead], page 326.

Section 2.2.71 [Note_spacing_engraver], page 241
Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):

Section 3.1.72 [NoteSpacing], page 327.

Section 2.2.73 [Output_property_engraver], page 242
Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

Section 2.2.77 [Part_combine_engraver], page 243
Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted:

Section 1.2.41 [part-combine-event], page 42

Properties (read)

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

`printPartCombineTexts` (boolean)
Set 'Solo' and 'A due' texts in the part combiner?

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

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

This engraver creates the following layout object(s):

Section 3.1.28 [CombineTextScript], page 290.

Section 2.2.78 [Percent_repeat_engraver], page 243
Make whole bar and double bar repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.77 [PercentRepeat], page 331 and Section 3.1.78 [PercentRepeatCounter], page 332.

`Section 2.2.79 [Phrasing_slur_engraver], page 244`
: Print phrasing slurs. Similar to Section 2.2.96 [Slur_engraver], page 249.

Music types accepted:

Section 1.2.46 [phrasing-slur-event], page 43

This engraver creates the following layout object(s):

Section 3.1.79 [PhrasingSlur], page 333.

`Section 2.2.84 [Pitched_trill_engraver], page 246`
: Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s):

Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366 and Section 3.1.118 [TrillPitchHead], page 367.

`Section 2.2.86 [Repeat_tie_engraver], page 246`
: Create repeat ties.

Music types accepted:

Section 1.2.47 [repeat-tie-event], page 43

This engraver creates the following layout object(s):

Section 3.1.83 [RepeatTie], page 337 and Section 3.1.84 [RepeatTieColumn], page 338.

`Section 2.2.88 [Rest_engraver], page 247`
: Engrave rests.

Music types accepted:

Section 1.2.48 [rest-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.85 [Rest], page 339.

Section 2.2.89 [Rhythmic_column_engraver], page 247
: Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s):

Section 3.1.69 [NoteColumn], page 326.

Section 2.2.91 [Script_column_engraver], page 247
: Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s):

Section 3.1.88 [ScriptColumn], page 340.

Section 2.2.92 [Script_engraver], page 248
: Handle note scripted articulations.

Music types accepted:

Section 1.2.5 [articulation-event], page 38

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.87 [Script], page 339.

Section 2.2.95 [Slash_repeat_engraver], page 249
: Make beat repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.82 [RepeatSlash], page 337.

Section 2.2.96 [Slur_engraver], page 249
: Build slur grobs from slur events.

Music types accepted:

Section 1.2.52 [slur-event], page 44

Properties (read)

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

`slurMelismaBusy` (boolean)
: Signal if a slur is present.

This engraver creates the following layout object(s):

Section 3.1.90 [Slur], page 341.

`Section 2.2.101 [Spanner_break_forbid_engraver], page 250`
: Forbid breaks in certain spanners.

`Section 2.2.107 [Stem_engraver], page 251`
: Create stems and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:

Section 1.2.67 [tremolo-event], page 46

Properties (read)

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

`stemRightBeamCount` (integer)
: See `stemLeftBeamCount`.

`tremoloFlags` (integer)
: The number of tremolo flags to add if no number is specified.

This engraver creates the following layout object(s):

Section 3.1.99 [Stem], page 348 and Section 3.1.100 [StemTremolo], page 350.

`Section 2.2.113 [Text_engraver], page 254`
: Create text scripts.

Music types accepted:

Section 1.2.64 [text-script-event], page 46

This engraver creates the following layout object(s):

Section 3.1.111 [TextScript], page 360.

`Section 2.2.114 [Text_spanner_engraver], page 254`
: Create text spanner from an event.

Music types accepted:

Section 1.2.65 [text-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.112 [TextSpanner], page 361.

Section 2.2.115 [Tie_engraver], page 254

Generate ties between note heads of equal pitch.

Music types accepted:

Section 1.2.66 [tie-event], page 46

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.

This engraver creates the following layout object(s):

Section 3.1.113 [Tie], page 362 and Section 3.1.114 [TieColumn], page 364.

Section 2.2.121 [Trill_spanner_engraver], page 256

Create trill spanner from an event.

Music types accepted:

Section 1.2.69 [trill-span-event], page 46

Properties (read)

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

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

This engraver creates the following layout object(s):

Section 3.1.119 [TrillSpanner], page 368.

Section 2.2.122 [Tuplet_engraver], page 256

Catch tuplet events and generate appropriate bracket.

Music types accepted:

Section 1.2.70 [tuplet-span-event], page 46

Properties (read)

`tupletFullLength` (boolean)
: If set, the tuplet is printed up to the start of the next note.

`tupletFullLengthNote` (boolean)
: If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

This engraver creates the following layout object(s):

Section 3.1.120 [TupletBracket], page 369 and Section 3.1.121 [TupletNumber], page 370.

Section 2.2.123 [Tweak_engraver], page 257
: Read the `tweaks` property from the originating event, and set properties.

### 2.1.4 Devnull

Silently discards all musical information given to this context.

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

Staff and Voice.

This context creates the following layout object(s):

none.

This context is a 'bottom' context; it cannot contain other contexts.

### 2.1.5 DrumStaff

Handles typesetting for percussion.

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

Staff.

This context creates the following layout object(s):

Section 3.1.11 [BarLine], page 277, Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.15 [BassFigureAlignmentPositioning], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282, Section 3.1.18 [BassFigureLine], page 283, Section 3.1.25 [Clef], page 288, Section 3.1.30 [DotColumn], page 292, Section 3.1.47 [InstrumentName], page 308, Section 3.1.53 [LedgerLineSpanner], page 313, Section 3.1.68 [NoteCollision], page 325, Section 3.1.73 [OctavateEight], page 328, Section 3.1.86 [RestCollision], page 339, Section 3.1.89 [ScriptRow], page 341, Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.96 [StaffSpacing], page 347, Section 3.1.97 [StaffSymbol], page 347, Section 3.1.104 [SustainPedalLineSpanner], page 354, Section 3.1.115 [TimeSignature], page 364, Section 3.1.123 [UnaCordaPedalLineSpanner], page 372 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set grob-property `staff-padding` in Section 3.1.87 [Script], page 339 to `0.75`.
- Set translator property `clefGlyph` to `"clefs.percussion"`.
- Set translator property `clefPosition` to `0`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localKeySignature` to `'()`.
- Set translator property `shortInstrumentName` to `'()`.

Context DrumStaff can contain Section 2.1.3 [CueVoice], page 54 and Section 2.1.6 [DrumVoice], page 72.

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

Section 2.2.5 [Axis_group_engraver], page 220
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

  Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.7 [Bar_engraver], page 220

Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point.

Properties (read)

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

  ```
  \set Staff.whichBar = "|:"
  ```

  This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.11 [BarLine], page 277.

Section 2.2.16 [Clef_engraver], page 224

Determine and set reference point for pitches.

Properties (read)

`clefGlyph` (string)
: Name of the symbol within the music font.

`clefOctavation` (integer)
: Add this much extra octavation. Values of 7 and -7 are common.

`clefPosition` (number)
: Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`forceClef` (boolean)
: Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):

Section 3.1.25 [Clef], page 288 and Section 3.1.73 [OctavateEight], page 328.

Section 2.2.18 [Collision_engraver], page 224

Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s):

Section 3.1.68 [NoteCollision], page 325.

Section 2.2.23 [Dot_column_engraver], page 226
: Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

  This engraver creates the following layout object(s):

  Section 3.1.30 [DotColumn], page 292.

Section 2.2.33 [Figured_bass_engraver], page 229
: Make figured bass numbers.

  Music types accepted:

  Section 1.2.6 [bass-figure-event], page 38 and Section 1.2.48 [rest-event], page 43

  Properties (read)

  `figuredBassAlterationDirection` (direction)
  : Where to put alterations relative to the main figure.

  `figuredBassCenterContinuations` (boolean)
  : Whether to vertically center pairs of extender lines. This does not work with three or more lines.

  `figuredBassFormatter` (procedure)
  : A routine generating a markup for a bass figure.

  `ignoreFiguredBassRest` (boolean)
  : Don't swallow rest events.

  `implicitBassFigures` (list)
  : A list of bass figures that are not printed as numbers, but only as extender lines.

  `useBassFigureExtenders` (boolean)
  : Whether to use extender lines for repeated bass figures.

  This engraver creates the following layout object(s):

  Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282 and Section 3.1.18 [BassFigureLine], page 283.

Section 2.2.34 [Figured_bass_position_engraver], page 229
: Position figured bass alignments over notes.

  This engraver creates the following layout object(s):

  Section 3.1.15 [BassFigureAlignmentPositioning], page 281.

Section 2.2.36 [Font_size_engraver], page 230
: Put `fontSize` into `font-size` grob property.

  Properties (read)

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

Section 2.2.45 [Grob_pq_engraver], page 233
: Administrate when certain grobs (e.g., note heads) stop playing.

  Properties (read)

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

Properties (write)

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

`Section 2.2.49 [Instrument_name_engraver], page 234`
Create a system start text for instrument or vocal names.

Properties (read)

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

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

`shortInstrumentName` (markup)
: See `instrumentName`.

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

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308.

`Section 2.2.55 [Ledger_line_engraver], page 236`
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):

Section 3.1.53 [LedgerLineSpanner], page 313.

`Section 2.2.73 [Output_property_engraver], page 242`
Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

`Section 2.2.80 [Piano_pedal_align_engraver], page 244`
Align piano pedal symbols and brackets.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.104 [SustainPedalLineSpanner], page 354 and Section 3.1.123 [UnaCordaPedalLineSpanner], page 372.

Section 2.2.87 [Rest_collision_engraver], page 246
Handle collisions of rests.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.86 [RestCollision], page 339.

Section 2.2.93 [Script_row_engraver], page 248
Determine order in horizontal side position elements.

This engraver creates the following layout object(s):

Section 3.1.89 [ScriptRow], page 341.

Section 2.2.94 [Separating_line_group_engraver], page 248
Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.96 [StaffSpacing], page 347.

Section 2.2.102 [Staff_collecting_engraver], page 250
Maintain the `stavesFound` variable.

Properties (read)

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

Properties (write)

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

Section 2.2.104 [Staff_symbol_engraver], page 251
: Create the constellation of five (default) staff lines.

  Music types accepted:

  Section 1.2.59 [staff-span-event], page 45

  This engraver creates the following layout object(s):

  Section 3.1.97 [StaffSymbol], page 347.

Section 2.2.117 [Time_signature_engraver], page 255
: Create a Section 3.1.115 [TimeSignature], page 364 whenever `timeSignatureFraction` changes.

  Properties (read)

  `implicitTimeSignatureVisibility` (vector)
  : break visibility for the default time signature.

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

  This engraver creates the following layout object(s):

  Section 3.1.115 [TimeSignature], page 364.

### 2.1.6 DrumVoice

A voice on a percussion staff.

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

Voice.

This context creates the following layout object(s):

Section 3.1.19 [Beam], page 283, Section 3.1.20 [BendAfter], page 285, Section 3.1.23 [BreathingSign], page 287, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.31 [Dots], page 293, Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.44 [Hairpin], page 305, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.51 [LaissezVibrerTie], page 312, Section 3.1.52 [LaissezVibrerTieColumn], page 313, Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.69 [NoteColumn], page 326, Section 3.1.70 [NoteHead], page 326, Section 3.1.72 [NoteSpacing], page 327, Section 3.1.77 [PercentRepeat], page 331, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.79 [PhrasingSlur], page 333, Section 3.1.82 [RepeatSlash], page 337, Section 3.1.83 [RepeatTie], page 337, Section 3.1.84 [RepeatTieColumn], page 338, Section 3.1.85 [Rest], page 339, Section 3.1.87 [Script], page 339, Section 3.1.88 [ScriptColumn], page 340, Section 3.1.90 [Slur], page 341, Section 3.1.99 [Stem], page 348, Section 3.1.100 [StemTremolo], page 350, Section 3.1.111 [TextScript], page 360, Section 3.1.112 [TextSpanner], page 361, Section 3.1.113 [Tie], page 362, Section 3.1.114 [TieColumn], page 364, Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.118 [TrillPitchHead], page 367, Section 3.1.119 [TrillSpanner], page 368, Section 3.1.120 [TupletBracket], page 369 and Section 3.1.121 [TupletNumber], page 370.

This context sets the following properties:

- Set translator property `localKeySignature` to `'()`.

This context is a 'bottom' context; it cannot contain other contexts.

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

Section 2.2.4 [Auto_beam_engraver], page 219
: Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.107 [Stem_engraver], page 251 properties `stemLeftBeamCount` and `stemRightBeamCount`.

  Music types accepted:

  Section 1.2.8 [beam-forbid-event], page 39

  Properties (read)

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

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

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

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

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

  This engraver creates the following layout object(s):

  Section 3.1.19 [Beam], page 283.

Section 2.2.9 [Beam_engraver], page 221
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

  Music types accepted:

  Section 1.2.7 [beam-event], page 38

  Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.11 [Bend_engraver], page 222`
Create fall spanners.

Music types accepted:

Section 1.2.9 [bend-after-event], page 39

This engraver creates the following layout object(s):

Section 3.1.20 [BendAfter], page 285.

`Section 2.2.13 [Breathing_sign_engraver], page 223`
Create a breathing sign.

Music types accepted:

Section 1.2.13 [breathing-event], page 39

This engraver creates the following layout object(s):

Section 3.1.23 [BreathingSign], page 287.

`Section 2.2.15 [Chord_tremolo_engraver], page 223`
Generate beams for tremolo repeats.

Music types accepted:

Section 1.2.68 [tremolo-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.24 [Dots_engraver], page 226`
Create Section 3.1.31 [Dots], page 293 objects for Section 3.2.82 [rhythmic-head-interface], page 419s.

This engraver creates the following layout object(s):

Section 3.1.31 [Dots], page 293.

`Section 2.2.26 [Drum_notes_engraver], page 227`
Generate drum note heads.

Music types accepted:

Section 1.2.37 [note-event], page 42

Properties (read)

`drumStyleTable` (hash table)
: A hash table which maps drums to layout settings. Predefined values: '`drums-style`', '`timbales-style`', '`congas-style`', '`bongos-style`', and '`percussion-style`'.

  The layout style is a hash table, containing the drum-pitches (e.g., the symbol '`hihat`')

as keys, and a list `(notehead-style script vertical-position)` as values.

This engraver creates the following layout object(s):

Section 3.1.70 [NoteHead], page 326 and Section 3.1.87 [Script], page 339.

Section 2.2.27 [Dynamic_align_engraver], page 227

Align hairpins and dynamic texts on a horizontal line.

Music types accepted:

Section 1.2.12 [break-span-event], page 39

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.34 [DynamicLineSpanner], page 296.

Section 2.2.36 [Font_size_engraver], page 230

Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.37 [Forbid_line_break_engraver], page 230

Forbid line breaks when note heads are still playing at some point.

Properties (read)

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

Properties (write)

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

Section 2.2.40 [Grace_beam_engraver], page 231

Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.41 [Grace_engraver], page 232
: Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

Section 2.2.45 [Grob_pq_engraver], page 233
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.45 [Grob_pq_engraver], page 233
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.50 [Instrument_switch_engraver], page 234
Create a cue text for taking instrument.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.48 [InstrumentSwitch], page 309.

Section 2.2.54 [Laissez_vibrer_engraver], page 236
Create laissez vibrer items.

Music types accepted:

Section 1.2.27 [laissez-vibrer-event], page 40

This engraver creates the following layout object(s):

Section 3.1.51 [LaissezVibrerTie], page 312 and Section 3.1.52 [LaissezVibrerTieColumn], page 313.

Section 2.2.64 [Multi_measure_rest_engraver], page 238
Engrave multi-measure rests that are produced with 'R'. It reads `measurePosition` and `internalBarNumber` to determine what number to print over the Section 3.1.64 [MultiMeasureRest], page 321. Reads `measureLength` to determine whether it should use a whole rest or a breve rest to represent one measure.

Music types accepted:

Section 1.2.34 [multi-measure-rest-event], page 41 and Section 1.2.35 [multi-measure-text-event], page 41

Properties (read)

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

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322 and Section 3.1.66 [MultiMeasureRestText], page 323.

Section 2.2.65 [New_dynamic_engraver], page 239
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:

Section 1.2.1 [absolute-dynamic-event], page 38 and Section 1.2.57 [span-dynamic-event], page 44

Properties (read)

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

`crescendoText` (markup)
The text to print at start of non-hairpin crescendo, i.e., '`cresc.`'.

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

`decrescendoSpanner` (symbol)
The type of spanner to be used for decrescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin decrescendo is used.

`decrescendoText` (markup)
The text to print at start of non-hairpin decrescendo, i.e., '`dim.`'.

This engraver creates the following layout object(s):

Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298 and Section 3.1.44 [Hairpin], page 305.

Section 2.2.71 [Note_spacing_engraver], page 241
Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):

Section 3.1.72 [NoteSpacing], page 327.

Section 2.2.73 [Output_property_engraver], page 242
Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

Section 2.2.77 [Part_combine_engraver], page 243
Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted:

Section 1.2.41 [part-combine-event], page 42

Properties (read)

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

`printPartCombineTexts` (boolean)
: Set 'Solo' and 'A due' texts in the part combiner?

`soloIIText` (markup)
: The text for the start of a solo for voice 'two' when part-combining.

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

This engraver creates the following layout object(s):

Section 3.1.28 [CombineTextScript], page 290.

`Section 2.2.78 [Percent_repeat_engraver], page 243`

Make whole bar and double bar repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.77 [PercentRepeat], page 331 and Section 3.1.78 [PercentRepeatCounter], page 332.

`Section 2.2.79 [Phrasing_slur_engraver], page 244`

Print phrasing slurs. Similar to Section 2.2.96 [Slur_engraver], page 249.

Music types accepted:

Section 1.2.46 [phrasing-slur-event], page 43

This engraver creates the following layout object(s):

Section 3.1.79 [PhrasingSlur], page 333.

Section 2.2.84 [Pitched_trill_engraver], page 246
: Print the bracketed note head after a note head with trill.

  This engraver creates the following layout object(s):

  Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366 and Section 3.1.118 [TrillPitchHead], page 367.

Section 2.2.86 [Repeat_tie_engraver], page 246
: Create repeat ties.

  Music types accepted:

  Section 1.2.47 [repeat-tie-event], page 43

  This engraver creates the following layout object(s):

  Section 3.1.83 [RepeatTie], page 337 and Section 3.1.84 [RepeatTieColumn], page 338.

Section 2.2.88 [Rest_engraver], page 247
: Engrave rests.

  Music types accepted:

  Section 1.2.48 [rest-event], page 43

  Properties (read)

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

  This engraver creates the following layout object(s):

  Section 3.1.85 [Rest], page 339.

Section 2.2.89 [Rhythmic_column_engraver], page 247
: Generate `NoteColumn`, an object that groups stems, note heads, and rests.

  This engraver creates the following layout object(s):

  Section 3.1.69 [NoteColumn], page 326.

Section 2.2.91 [Script_column_engraver], page 247
: Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

  This engraver creates the following layout object(s):

  Section 3.1.88 [ScriptColumn], page 340.

Section 2.2.92 [Script_engraver], page 248
: Handle note scripted articulations.

  Music types accepted:

  Section 1.2.5 [articulation-event], page 38

  Properties (read)

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

  This engraver creates the following layout object(s):

  Section 3.1.87 [Script], page 339.

Section 2.2.95 [Slash_repeat_engraver], page 249
Make beat repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.82 [RepeatSlash], page 337.

Section 2.2.96 [Slur_engraver], page 249
Build slur grobs from slur events.

Music types accepted:

Section 1.2.52 [slur-event], page 44

Properties (read)

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

`slurMelismaBusy` (boolean)
Signal if a slur is present.

This engraver creates the following layout object(s):

Section 3.1.90 [Slur], page 341.

Section 2.2.101 [Spanner_break_forbid_engraver], page 250
Forbid breaks in certain spanners.

Section 2.2.107 [Stem_engraver], page 251
Create stems and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:

Section 1.2.67 [tremolo-event], page 46

Properties (read)

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

`stemRightBeamCount` (integer)
See `stemLeftBeamCount`.

`tremoloFlags` (integer)
The number of tremolo flags to add if no number is specified.

This engraver creates the following layout object(s):

Section 3.1.99 [Stem], page 348 and Section 3.1.100 [StemTremolo], page 350.

Section 2.2.113 [Text_engraver], page 254
Create text scripts.

Music types accepted:

Section 1.2.64 [text-script-event], page 46

This engraver creates the following layout object(s):

Section 3.1.111 [TextScript], page 360.

Section 2.2.114 [Text_spanner_engraver], page 254
Create text spanner from an event.

Music types accepted:

Section 1.2.65 [text-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.112 [TextSpanner], page 361.

Section 2.2.115 [Tie_engraver], page 254
Generate ties between note heads of equal pitch.

Music types accepted:

Section 1.2.66 [tie-event], page 46

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.

This engraver creates the following layout object(s):

Section 3.1.113 [Tie], page 362 and Section 3.1.114 [TieColumn], page 364.

Section 2.2.121 [Trill_spanner_engraver], page 256
Create trill spanner from an event.

Music types accepted:

Section 1.2.69 [trill-span-event], page 46

Properties (read)

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

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

This engraver creates the following layout object(s):

Section 3.1.119 [TrillSpanner], page 368.

Section 2.2.122 [Tuplet_engraver], page 256
: Catch tuplet events and generate appropriate bracket.

  Music types accepted:

  Section 1.2.70 [tuplet-span-event], page 46

  Properties (read)

  `tupletFullLength` (boolean)
  : If set, the tuplet is printed up to the start of the next note.

  `tupletFullLengthNote` (boolean)
  : If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

  This engraver creates the following layout object(s):

  Section 3.1.120 [TupletBracket], page 369 and Section 3.1.121 [TupletNumber], page 370.

Section 2.2.123 [Tweak_engraver], page 257
: Read the `tweaks` property from the originating event, and set properties.

### 2.1.7 Dynamics

Holds a single line of dynamics, which will be centered between the staves surrounding this context.

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

Voice.

This context creates the following layout object(s):

Section 3.1.11 [BarLine], page 277, Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.44 [Hairpin], page 305, Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.87 [Script], page 339, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.103 [SustainPedal], page 353, Section 3.1.111 [TextScript], page 360, Section 3.1.112 [TextSpanner], page 361, Section 3.1.122 [UnaCordaPedal], page 371 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set grob-property `font-shape` in Section 3.1.111 [TextScript], page 360 to `'italic`.
- Set grob-property `nonstaff-relatedstaff-spacing` in Section 3.1.126 [VerticalAxisGroup], page 373 to `'((space . 5) (padding . 0.5))`.
- Set grob-property `staff-affinity` in Section 3.1.126 [VerticalAxisGroup], page 373 to `0`.
- Set grob-property `Y-offset` in Section 3.1.34 [DynamicLineSpanner], page 296 to `0`.
- Set translator property `pedalSustainStrings` to `'(Ped. *Ped. *)`.
- Set translator property `pedalUnaCordaStrings` to `'(una corda tre corde)`.

This context is a 'bottom' context; it cannot contain other contexts.

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

Section 2.2.5 [Axis_group_engraver], page 220
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

  Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.7 [Bar_engraver], page 220
: Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point.

Properties (read)

`whichBar` (string)
: This property is read to determine what type of bar line to create.

Example:

```
\set Staff.whichBar = "|:"
```

This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.11 [BarLine], page 277.

Section 2.2.27 [Dynamic_align_engraver], page 227
: Align hairpins and dynamic texts on a horizontal line.

Music types accepted:

Section 1.2.12 [break-span-event], page 39

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.34 [DynamicLineSpanner], page 296.

Section 2.2.65 [New_dynamic_engraver], page 239
: Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:

Section 1.2.1 [absolute-dynamic-event], page 38 and Section 1.2.57 [span-dynamic-event], page 44

Properties (read)

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

`crescendoText` (markup)
: The text to print at start of non-hairpin crescendo, i.e., '`cresc.`'.

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

`decrescendoSpanner` (symbol)
: The type of spanner to be used for decrescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin decrescendo is used.

`decrescendoText` (markup)
: The text to print at start of non-hairpin decrescendo, i.e., '`dim.`'.

This engraver creates the following layout object(s):

Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298 and Section 3.1.44 [Hairpin], page 305.

`Section 2.2.73 [Output_property_engraver], page 242`
: Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

`Section 2.2.81 [Piano_pedal_engraver], page 245`
: Engrave piano pedal symbols and brackets.

Music types accepted:

Section 1.2.55 [sostenuto-event], page 44, Section 1.2.63 [sustain-event], page 46 and Section 1.2.71 [una-corda-event], page 46

Properties (read)

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

`pedalSostenutoStrings` (list)
: See `pedalSustainStrings`.

`pedalSostenutoStyle` (symbol)
: See `pedalSustainStyle`.

`pedalSustainStrings` (list)
: A list of strings to print for sustain-pedal. Format is `(up updown down)`, where each of the three is the string to print when this is done with the pedal.

`pedalSustainStyle` (symbol)
: A symbol that indicates how to print sustain pedals: `text`, `bracket` or `mixed` (both).

`pedalUnaCordaStrings` (list)
: See `pedalSustainStrings`.

`pedalUnaCordaStyle` (symbol)
See `pedalSustainStyle`.

This engraver creates the following layout object(s):

Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.103 [SustainPedal], page 353 and Section 3.1.122 [UnaCordaPedal], page 371.

`Section 2.2.92 [Script_engraver], page 248`
Handle note scripted articulations.

Music types accepted:

Section 1.2.5 [articulation-event], page 38

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.87 [Script], page 339.

`Section 2.2.113 [Text_engraver], page 254`
Create text scripts.

Music types accepted:

Section 1.2.64 [text-script-event], page 46

This engraver creates the following layout object(s):

Section 3.1.111 [TextScript], page 360.

`Section 2.2.114 [Text_spanner_engraver], page 254`
Create text spanner from an event.

Music types accepted:

Section 1.2.65 [text-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.112 [TextSpanner], page 361.

### 2.1.8 FiguredBass

A context for printing a figured bass line.

This context creates the following layout object(s):

Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282, Section 3.1.18 [BassFigureLine], page 283, Section 3.1.96 [StaffSpacing], page 347 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set grob-property `nonstaff-nonstaff-spacing padding` in Section 3.1.126 [VerticalAxisGroup], page 373 to `0.5`.
- Set grob-property `nonstaff-relatedstaff-spacing padding` in Section 3.1.126 [VerticalAxisGroup], page 373 to `0.5`.
- Set grob-property `remove-empty` in Section 3.1.126 [VerticalAxisGroup], page 373 to `#t`.
- Set grob-property `remove-first` in Section 3.1.126 [VerticalAxisGroup], page 373 to `#t`.

- Set grob-property `staff-affinity` in Section 3.1.126 [VerticalAxisGroup], page 373 to `1`.

This context is a 'bottom' context; it cannot contain other contexts.

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

Section 2.2.33 [Figured_bass_engraver], page 229

Make figured bass numbers.

Music types accepted:

Section 1.2.6 [bass-figure-event], page 38 and Section 1.2.48 [rest-event], page 43

Properties (read)

`figuredBassAlterationDirection` (direction)
: Where to put alterations relative to the main figure.

`figuredBassCenterContinuations` (boolean)
: Whether to vertically center pairs of extender lines. This does not work with three or more lines.

`figuredBassFormatter` (procedure)
: A routine generating a markup for a bass figure.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):

Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282 and Section 3.1.18 [BassFigureLine], page 283.

Section 2.2.46 [Hara_kiri_engraver], page 233

Like `Axis_group_engraver`, but make a hara-kiri spanner, and add interesting items (i.e., note heads, lyric syllables, and normal rests).

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.94 [Separating_line_group_engraver], page 248

Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.96 [StaffSpacing], page 347.

### 2.1.9 FretBoards

A context for displaying fret diagrams.

This context creates the following layout object(s):

Section 3.1.39 [FretBoard], page 302, Section 3.1.47 [InstrumentName], page 308, Section 3.1.96 [StaffSpacing], page 347 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set translator property `predefinedDiagramTable` to `#<hash-table 0/113>`.

This context is a 'bottom' context; it cannot contain other contexts.

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

`Section 2.2.36 [Font_size_engraver], page 230`
: Put `fontSize` into `font-size` grob property.

Properties (read)

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

`Section 2.2.38 [Fretboard_engraver], page 230`
: Generate fret diagram from one or more events of type `NoteEvent`.

Music types accepted:

Section 1.2.37 [note-event], page 42 and Section 1.2.61 [string-number-event], page 45

Properties (read)

`chordChanges` (boolean)
: Only show changes in chords scheme?

`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 pitch (in semitones) of each string (starting with the lower one).

`tablatureFormat` (procedure)
: A function formatting a tablature note head. Called with three arguments: context, string number and, fret number. It returns the text as a markup.

This engraver creates the following layout object(s):

Section 3.1.39 [FretBoard], page 302.

Section 2.2.46 [Hara_kiri_engraver], page 233
: Like `Axis_group_engraver`, but make a hara-kiri spanner, and add interesting items (i.e., note heads, lyric syllables, and normal rests).

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.49 [Instrument_name_engraver], page 234
: Create a system start text for instrument or vocal names.

Properties (read)

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

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

`shortInstrumentName` (markup)
: See `instrumentName`.

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

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308.

`Section 2.2.73 [Output_property_engraver], page 242`
: Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

`Section 2.2.94 [Separating_line_group_engraver], page 248`
: Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.96 [StaffSpacing], page 347.

### 2.1.10 Global

Hard coded entry point for LilyPond. Cannot be tuned.

This context creates the following layout object(s):

none.

Context Global can contain Section 2.1.20 [Score], page 143.

### 2.1.11 GrandStaff

A group of staves, with a brace on the left side, grouping the staves together. The bar lines of the contained staves are connected vertically.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276, Section 3.1.94 [SpanBar], page 345, Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357 and Section 3.1.109 [SystemStartSquare], page 358.

This context sets the following properties:

- Set translator property `localKeySignature` to `'()`.
- Set translator property `systemStartDelimiter` to `'SystemStartBrace`.
- Set translator property `topLevelAlignment` to `#f`.

Context GrandStaff can contain Section 2.1.7 [Dynamics], page 83, Section 2.1.8 [FiguredBass], page 86 and Section 2.1.21 [Staff], page 155.

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

Section 2.2.99 [Span_arpeggio_engraver], page 250
: Make arpeggios that span multiple staves.

  Properties (read)

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

  This engraver creates the following layout object(s):

  Section 3.1.9 [Arpeggio], page 276.

Section 2.2.100 [Span_bar_engraver], page 250
: Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.

  This engraver creates the following layout object(s):

  Section 3.1.94 [SpanBar], page 345.

Section 2.2.108 [System_start_delimiter_engraver], page 252
: Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

  Properties (read)

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

  `systemStartDelimiter` (symbol)
  : Which grob to make for the start of the system/staff? Set to `SystemStartBrace`, `SystemStartBracket` or `SystemStartBar`.

  `systemStartDelimiterHierarchy` (pair)
  : A nested list, indicating the nesting of a start delimiters.

  This engraver creates the following layout object(s):

  Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357 and Section 3.1.109 [SystemStartSquare], page 358.

### 2.1.12 GregorianTranscriptionStaff

Handles clefs, bar lines, keys, accidentals. It can contain `Voice` contexts.

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

Staff.

This context creates the following layout object(s):

Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.3 [AccidentalPlacement], page 271, Section 3.1.4 [AccidentalSuggestion], page 272, Section 3.1.11 [BarLine], page 277, Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.15 [BassFigureAlignmentPositioning], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282, Section 3.1.18 [BassFigureLine], page 283, Section 3.1.25 [Clef], page 288, Section 3.1.30 [DotColumn], page 292, Section 3.1.47 [InstrumentName], page 308, Section 3.1.49 [KeyCancellation], page 310, Section 3.1.50 [KeySignature], page 311,

Section 3.1.53 [LedgerLineSpanner], page 313, Section 3.1.68 [NoteCollision], page 325, Section 3.1.73 [OctavateEight], page 328, Section 3.1.74 [OttavaBracket], page 329, Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.86 [RestCollision], page 339, Section 3.1.89 [ScriptRow], page 341, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.96 [StaffSpacing], page 347, Section 3.1.97 [StaffSymbol], page 347, Section 3.1.103 [SustainPedal], page 353, Section 3.1.104 [SustainPedalLineSpanner], page 354, Section 3.1.115 [TimeSignature], page 364, Section 3.1.122 [UnaCordaPedal], page 371, Section 3.1.123 [UnaCordaPedalLineSpanner], page 372 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set grob-property `transparent` in Section 3.1.11 [BarLine], page 277 to `#t`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localKeySignature` to `'()`.
- Set translator property `shortInstrumentName` to `'()`.

Context GregorianTranscriptionStaff can contain Section 2.1.3 [CueVoice], page 54 and Section 2.1.13 [GregorianTranscriptionVoice], page 100.

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

Section 2.2.1 [Accidental_engraver], page 217

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)

`autoAccidentals` (list)

List of different ways to typeset an accidental.

For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used.

Each entry in the list is either a symbol or a procedure.

*symbol* The symbol is the name of the context in which the following rules are to be applied. For example, if *context* is Section "Score" in *Internals Reference* then all staves share accidentals, and if *context* is Section "Staff" in *Internals Reference* then all voices in the same staff share accidentals, but staves do not.

*procedure* The procedure represents an accidental rule to be applied to the previously specified context.

The procedure takes the following arguments:

`context` The current context to which the rule should be applied.

`pitch` The pitch of the note to be evaluated.

`barnum` The current bar number.

`measurepos` The current measure position.

The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. `(#t . #f)` does not make sense.

`autoCautionaries` (list)
: List similar to `autoAccidentals`, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals changing from a non-natural to another non-natural.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

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

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`localKeySignature` (list)
: The key signature at this point in the measure. The format is the same as for `keySignature`, but can also contain `((`*`octave . name`*`) . (`*`alter barnumber . measureposition`*`))` pairs.

Properties (write)

`localKeySignature` (list)
: The key signature at this point in the measure. The format is the same as for `keySignature`, but can also contain `((`*`octave . name`*`) . (`*`alter barnumber . measureposition`*`))` pairs.

This engraver creates the following layout object(s):

Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.3 [AccidentalPlacement], page 271 and Section 3.1.4 [AccidentalSuggestion], page 272.

Section 2.2.5 [Axis_group_engraver], page 220

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

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.7 [Bar_engraver], page 220

Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point.

Properties (read)

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

  ```
  \set Staff.whichBar = "|:"
  ```

  This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.11 [BarLine], page 277.

Section 2.2.16 [Clef_engraver], page 224

Determine and set reference point for pitches.

Properties (read)

`clefGlyph` (string)
: Name of the symbol within the music font.

`clefOctavation` (integer)
: Add this much extra octavation. Values of 7 and -7 are common.

`clefPosition` (number)
: Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`forceClef` (boolean)
: Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):

Section 3.1.25 [Clef], page 288 and Section 3.1.73 [OctavateEight], page 328.

Section 2.2.18 [Collision_engraver], page 224
: Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s):

Section 3.1.68 [NoteCollision], page 325.

Section 2.2.23 [Dot_column_engraver], page 226
: Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s):

Section 3.1.30 [DotColumn], page 292.

Section 2.2.33 [Figured_bass_engraver], page 229
: Make figured bass numbers.

Music types accepted:

Section 1.2.6 [bass-figure-event], page 38 and Section 1.2.48 [rest-event], page 43

Properties (read)

`figuredBassAlterationDirection` (direction)
: Where to put alterations relative to the main figure.

`figuredBassCenterContinuations` (boolean)
: Whether to vertically center pairs of extender lines. This does not work with three or more lines.

`figuredBassFormatter` (procedure)
: A routine generating a markup for a bass figure.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):

Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigure-Alignment], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282 and Section 3.1.18 [BassFigureLine], page 283.

Section 2.2.34 [Figured_bass_position_engraver], page 229
Position figured bass alignments over notes.

This engraver creates the following layout object(s):

Section 3.1.15 [BassFigureAlignmentPositioning], page 281.

Section 2.2.36 [Font_size_engraver], page 230
Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.45 [Grob_pq_engraver], page 233
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.49 [Instrument_name_engraver], page 234
Create a system start text for instrument or vocal names.

Properties (read)

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

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

`shortInstrumentName` (markup)
See `instrumentName`.

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

`vocalName` (markup)
Name of a vocal line.

This engraver creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308.

Section 2.2.52 [Key_engraver], page 235

Engrave a key signature.

Music types accepted:

Section 1.2.25 [key-change-event], page 40

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 changing from a non-natural to another non-natural.

`keyAlterationOrder` (list)
: An alist that defines in what order alterations should be printed. The format is `(`*`step`* `.` *`alter`*`)`, where *step* is a number from 0 to 6 and *alter* from -2 (sharp) to 2 (flat).

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`lastKeySignature` (list)
: Last key signature before a key signature change.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`lastKeySignature` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
The tonic of the current scale.

This engraver creates the following layout object(s):

Section 3.1.49 [KeyCancellation], page 310 and Section 3.1.50 [KeySignature], page 311.

`Section 2.2.55 [Ledger_line_engraver], page 236`
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):

Section 3.1.53 [LedgerLineSpanner], page 313.

`Section 2.2.72 [Ottava_spanner_engraver], page 241`
Create a text spanner when the ottavation property changes.

Properties (read)

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

`middleCOffset` (number)
The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

`ottavation` (markup)
If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):

Section 3.1.74 [OttavaBracket], page 329.

`Section 2.2.73 [Output_property_engraver], page 242`
Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

`Section 2.2.80 [Piano_pedal_align_engraver], page 244`
Align piano pedal symbols and brackets.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.104 [SustainPedalLineSpanner], page 354 and Section 3.1.123 [UnaCordaPedalLineSpanner], page 372.

`Section 2.2.81 [Piano_pedal_engraver], page 245`
Engrave piano pedal symbols and brackets.

Music types accepted:

Section 1.2.55 [sostenuto-event], page 44, Section 1.2.63 [sustain-event], page 46 and Section 1.2.71 [una-corda-event], page 46

Properties (read)

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

`pedalSostenutoStrings` (list)
: See `pedalSustainStrings`.

`pedalSostenutoStyle` (symbol)
: See `pedalSustainStyle`.

`pedalSustainStrings` (list)
: A list of strings to print for sustain-pedal. Format is `(up updown down)`, where each of the three is the string to print when this is done with the pedal.

`pedalSustainStyle` (symbol)
: A symbol that indicates how to print sustain pedals: `text`, `bracket` or `mixed` (both).

`pedalUnaCordaStrings` (list)
: See `pedalSustainStrings`.

`pedalUnaCordaStyle` (symbol)
: See `pedalSustainStyle`.

This engraver creates the following layout object(s):

Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.103 [SustainPedal], page 353 and Section 3.1.122 [UnaCordaPedal], page 371.

`Section 2.2.87 [Rest_collision_engraver], page 246`
Handle collisions of rests.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.86 [RestCollision], page 339.

`Section 2.2.93 [Script_row_engraver], page 248`
Determine order in horizontal side position elements.

This engraver creates the following layout object(s):

Section 3.1.89 [ScriptRow], page 341.

`Section 2.2.94 [Separating_line_group_engraver], page 248`
Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.96 [StaffSpacing], page 347.

`Section 2.2.102 [Staff_collecting_engraver], page 250`
Maintain the `stavesFound` variable.

Properties (read)

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

Properties (write)

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

`Section 2.2.104 [Staff_symbol_engraver], page 251`
Create the constellation of five (default) staff lines.

Music types accepted:

Section 1.2.59 [staff-span-event], page 45

This engraver creates the following layout object(s):

Section 3.1.97 [StaffSymbol], page 347.

`Section 2.2.117 [Time_signature_engraver], page 255`
Create a Section 3.1.115 [TimeSignature], page 364 whenever `timeSignatureFraction` changes.

Properties (read)

`implicitTimeSignatureVisibility` (vector)
: break visibility for the default time signature.

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

This engraver creates the following layout object(s):

Section 3.1.115 [TimeSignature], page 364.

### 2.1.13 GregorianTranscriptionVoice

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

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

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

Voice.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276, Section 3.1.19 [Beam], page 283, Section 3.1.20 [BendAfter], page 285, Section 3.1.23 [BreathingSign], page 287, Section 3.1.26 [ClusterSpanner], page 289, Section 3.1.27 [ClusterSpannerBeacon], page 290, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.31 [Dots], page 293, Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.37 [Episema], page 299, Section 3.1.38 [Fingering], page 300, Section 3.1.40 [Glissando], page 303, Section 3.1.44 [Hairpin], page 305, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.51 [LaissezVibrerTie], page 312, Section 3.1.52 [LaissezVibrerTieColumn], page 313, Section 3.1.55 [LigatureBracket], page 314, Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.69 [NoteColumn], page 326, Section 3.1.70 [NoteHead], page 326, Section 3.1.72 [NoteSpacing], page 327, Section 3.1.77 [PercentRepeat], page 331, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.79 [PhrasingSlur], page 333, Section 3.1.82 [RepeatSlash], page 337, Section 3.1.83 [RepeatTie], page 337, Section 3.1.84 [RepeatTieColumn], page 338, Section 3.1.85 [Rest], page 339, Section 3.1.87 [Script], page 339, Section 3.1.88 [ScriptColumn], page 340, Section 3.1.90 [Slur], page 341, Section 3.1.99 [Stem], page 348, Section 3.1.100 [StemTremolo], page 350, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352, Section 3.1.111 [TextScript], page 360, Section 3.1.112 [TextSpanner], page 361, Section 3.1.113 [Tie], page 362, Section 3.1.114 [TieColumn], page 364, Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.118 [TrillPitchHead], page 367, Section 3.1.119 [TrillSpanner], page 368, Section 3.1.120 [TupletBracket], page 369, Section 3.1.121 [TupletNumber], page 370 and Section 3.1.127 [VoiceFollower], page 375.

This context sets the following properties:

- Set grob-property `padding` in Section 3.1.87 [Script], page 339 to `0.5`.
- Set grob-property `transparent` in Section 3.1.55 [LigatureBracket], page 314 to `#t`.
- Set translator property `autoBeaming` to `#f`.
- Set translator property `localKeySignature` to `'()`.

This context is a 'bottom' context; it cannot contain other contexts.

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

`Section 2.2.3 [Arpeggio_engraver], page 219`
: Generate an Arpeggio symbol.

  Music types accepted:

  Section 1.2.4 [arpeggio-event], page 38

  This engraver creates the following layout object(s):

  Section 3.1.9 [Arpeggio], page 276.

`Section 2.2.4 [Auto_beam_engraver], page 219`
: Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.107 [Stem_engraver], page 251 properties `stemLeftBeamCount` and `stemRightBeamCount`.

  Music types accepted:

  Section 1.2.8 [beam-forbid-event], page 39

  Properties (read)

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

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.9 [Beam_engraver], page 221
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.11 [Bend_engraver], page 222
Create fall spanners.

Music types accepted:

Section 1.2.9 [bend-after-event], page 39

This engraver creates the following layout object(s):

Section 3.1.20 [BendAfter], page 285.

`Section 2.2.13 [Breathing_sign_engraver], page 223`

Create a breathing sign.

Music types accepted:

Section 1.2.13 [breathing-event], page 39

This engraver creates the following layout object(s):

Section 3.1.23 [BreathingSign], page 287.

`Section 2.2.15 [Chord_tremolo_engraver], page 223`

Generate beams for tremolo repeats.

Music types accepted:

Section 1.2.68 [tremolo-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.17 [Cluster_spanner_engraver], page 224`

Engrave a cluster using `Spanner` notation.

Music types accepted:

Section 1.2.14 [cluster-note-event], page 39

This engraver creates the following layout object(s):

Section 3.1.26 [ClusterSpanner], page 289 and Section 3.1.27 [ClusterSpannerBeacon], page 290.

`Section 2.2.24 [Dots_engraver], page 226`

Create Section 3.1.31 [Dots], page 293 objects for Section 3.2.82 [rhythmic-head-interface], page 419s.

This engraver creates the following layout object(s):

Section 3.1.31 [Dots], page 293.

`Section 2.2.27 [Dynamic_align_engraver], page 227`

Align hairpins and dynamic texts on a horizontal line.

Music types accepted:

Section 1.2.12 [break-span-event], page 39

Properties (read)

`currentMusicalColumn` (graphical (layout) object)

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

This engraver creates the following layout object(s):

Section 3.1.34 [DynamicLineSpanner], page 296.

`Section 2.2.31 [Episema_engraver], page 228`

Create an *Editio Vaticana*-style episema line.

Music types accepted:

Section 1.2.19 [episema-event], page 40

This engraver creates the following layout object(s):

Section 3.1.37 [Episema], page 299.

Section 2.2.35 [Fingering_engraver], page 229
Create fingering scripts.

Music types accepted:

Section 1.2.21 [fingering-event], page 40 and Section 1.2.62 [stroke-finger-event], page 45

This engraver creates the following layout object(s):

Section 3.1.38 [Fingering], page 300.

Section 2.2.36 [Font_size_engraver], page 230
Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.37 [Forbid_line_break_engraver], page 230
Forbid line breaks when note heads are still playing at some point.

Properties (read)

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

Properties (write)

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

Section 2.2.39 [Glissando_engraver], page 231
Engrave glissandi.

Music types accepted:

Section 1.2.22 [glissando-event], page 40

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303.

Section 2.2.40 [Grace_beam_engraver], page 231
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.41 [Grace_engraver], page 232
: Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

Section 2.2.45 [Grob_pq_engraver], page 233
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.50 [Instrument_switch_engraver], page 234
: Create a cue text for taking instrument.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.48 [InstrumentSwitch], page 309.

Section 2.2.54 [Laissez_vibrer_engraver], page 236
: Create laissez vibrer items.

Music types accepted:

Section 1.2.27 [laissez-vibrer-event], page 40

This engraver creates the following layout object(s):

Section 3.1.51 [LaissezVibrerTie], page 312 and Section 3.1.52 [LaissezVibrerTieColumn], page 313.

Section 2.2.56 [Ligature_bracket_engraver], page 236
: Handle `Ligature_events` by engraving `Ligature` brackets.

Music types accepted:

Section 1.2.29 [ligature-event], page 41

This engraver creates the following layout object(s):

Section 3.1.55 [LigatureBracket], page 314.

Section 2.2.64 [Multi_measure_rest_engraver], page 238

Engrave multi-measure rests that are produced with 'R'. It reads `measurePosition` and `internalBarNumber` to determine what number to print over the Section 3.1.64 [MultiMeasureRest], page 321. Reads `measureLength` to determine whether it should use a whole rest or a breve rest to represent one measure.

Music types accepted:

Section 1.2.34 [multi-measure-rest-event], page 41 and Section 1.2.35 [multi-measure-text-event], page 41

Properties (read)

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

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322 and Section 3.1.66 [MultiMeasureRestText], page 323.

Section 2.2.65 [New_dynamic_engraver], page 239

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:

Section 1.2.1 [absolute-dynamic-event], page 38 and Section 1.2.57 [span-dynamic-event], page 44

Properties (read)

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

`crescendoText` (markup)
: The text to print at start of non-hairpin crescendo, i.e., '`cresc.`'.

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

`decrescendoSpanner` (symbol)
: The type of spanner to be used for decrescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin decrescendo is used.

`decrescendoText` (markup)
: The text to print at start of non-hairpin decrescendo, i.e., '`dim.`'.

This engraver creates the following layout object(s):

Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298 and Section 3.1.44 [Hairpin], page 305.

`Section 2.2.66 [New_fingering_engraver], page 240`

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

Properties (read)

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

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

`stringNumberOrientations` (list)
: See `fingeringOrientations`.

`strokeFingerOrientations` (list)
: See `fingeringOrientations`.

This engraver creates the following layout object(s):

Section 3.1.38 [Fingering], page 300, Section 3.1.87 [Script], page 339, Section 3.1.101 [StringNumber], page 351 and Section 3.1.102 [StrokeFinger], page 352.

`Section 2.2.67 [Note_head_line_engraver], page 240`

Engrave a line between two note heads, for example a glissando. If `followVoice` is set, staff switches also generate a line.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303 and Section 3.1.127 [VoiceFollower], page 375.

Section 2.2.68 [Note_heads_engraver], page 240
Generate note heads.

Music types accepted:

Section 1.2.37 [note-event], page 42

Properties (read)

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

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

This engraver creates the following layout object(s):

Section 3.1.70 [NoteHead], page 326.

Section 2.2.71 [Note_spacing_engraver], page 241
Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):

Section 3.1.72 [NoteSpacing], page 327.

Section 2.2.73 [Output_property_engraver], page 242
Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

Section 2.2.77 [Part_combine_engraver], page 243
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted:

Section 1.2.41 [part-combine-event], page 42

Properties (read)

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.28 [CombineTextScript], page 290.

`Section 2.2.78 [Percent_repeat_engraver], page 243`

Make whole bar and double bar repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.77 [PercentRepeat], page 331 and Section 3.1.78 [PercentRepeatCounter], page 332.

`Section 2.2.79 [Phrasing_slur_engraver], page 244`

Print phrasing slurs. Similar to Section 2.2.96 [Slur_engraver], page 249.

Music types accepted:

Section 1.2.46 [phrasing-slur-event], page 43

This engraver creates the following layout object(s):

Section 3.1.79 [PhrasingSlur], page 333.

`Section 2.2.84 [Pitched_trill_engraver], page 246`

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

This engraver creates the following layout object(s):

Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366 and Section 3.1.118 [TrillPitchHead], page 367.

`Section 2.2.86 [Repeat_tie_engraver], page 246`

Create repeat ties.

Music types accepted:

Section 1.2.47 [repeat-tie-event], page 43

This engraver creates the following layout object(s):

Section 3.1.83 [RepeatTie], page 337 and Section 3.1.84 [RepeatTieColumn], page 338.

Section 2.2.88 [Rest_engraver], page 247
Engrave rests.

Music types accepted:

Section 1.2.48 [rest-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.85 [Rest], page 339.

Section 2.2.89 [Rhythmic_column_engraver], page 247
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s):

Section 3.1.69 [NoteColumn], page 326.

Section 2.2.91 [Script_column_engraver], page 247
Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s):

Section 3.1.88 [ScriptColumn], page 340.

Section 2.2.92 [Script_engraver], page 248
Handle note scripted articulations.

Music types accepted:

Section 1.2.5 [articulation-event], page 38

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.87 [Script], page 339.

Section 2.2.95 [Slash_repeat_engraver], page 249
Make beat repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.82 [RepeatSlash], page 337.

Section 2.2.96 [Slur_engraver], page 249

Build slur grobs from slur events.

Music types accepted:

Section 1.2.52 [slur-event], page 44

Properties (read)

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

`slurMelismaBusy` (boolean)
: Signal if a slur is present.

This engraver creates the following layout object(s):

Section 3.1.90 [Slur], page 341.

Section 2.2.101 [Spanner_break_forbid_engraver], page 250

Forbid breaks in certain spanners.

Section 2.2.107 [Stem_engraver], page 251

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

Music types accepted:

Section 1.2.67 [tremolo-event], page 46

Properties (read)

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

`stemRightBeamCount` (integer)
: See `stemLeftBeamCount`.

`tremoloFlags` (integer)
: The number of tremolo flags to add if no number is specified.

This engraver creates the following layout object(s):

Section 3.1.99 [Stem], page 348 and Section 3.1.100 [StemTremolo], page 350.

Section 2.2.113 [Text_engraver], page 254

Create text scripts.

Music types accepted:

Section 1.2.64 [text-script-event], page 46

This engraver creates the following layout object(s):

Section 3.1.111 [TextScript], page 360.

Section 2.2.114 [Text_spanner_engraver], page 254

Create text spanner from an event.

Music types accepted:

Section 1.2.65 [text-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.112 [TextSpanner], page 361.

Section 2.2.115 [Tie_engraver], page 254

Generate ties between note heads of equal pitch.

Music types accepted:

Section 1.2.66 [tie-event], page 46

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.

This engraver creates the following layout object(s):

Section 3.1.113 [Tie], page 362 and Section 3.1.114 [TieColumn], page 364.

Section 2.2.121 [Trill_spanner_engraver], page 256

Create trill spanner from an event.

Music types accepted:

Section 1.2.69 [trill-span-event], page 46

Properties (read)

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

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

This engraver creates the following layout object(s):

Section 3.1.119 [TrillSpanner], page 368.

Section 2.2.122 [Tuplet_engraver], page 256

Catch tuplet events and generate appropriate bracket.

Music types accepted:

Section 1.2.70 [tuplet-span-event], page 46

Properties (read)

`tupletFullLength` (boolean)
: If set, the tuplet is printed up to the start of the next note.

`tupletFullLengthNote` (boolean)
: If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

This engraver creates the following layout object(s):

Section 3.1.120 [TupletBracket], page 369 and Section 3.1.121 [TupletNumber], page 370.

`Section 2.2.123 [Tweak_engraver], page 257`
Read the `tweaks` property from the originating event, and set properties.

### 2.1.14 Lyrics

Corresponds to a voice with lyrics. Handles the printing of a single line of lyrics.

This context creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308, Section 3.1.56 [LyricExtender], page 315, Section 3.1.57 [LyricHyphen], page 316, Section 3.1.58 [LyricSpace], page 317, Section 3.1.59 [LyricText], page 317, Section 3.1.98 [StanzaNumber], page 348 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set grob-property `bar-size` in Section 3.1.11 [BarLine], page 277 to `0.1`.
- Set grob-property `font-size` in Section 3.1.47 [InstrumentName], page 308 to `1.0`.
- Set grob-property `nonstaff-nonstaff-spacing` in Section 3.1.126 [VerticalAxisGroup], page 373 to `'((space . 0) (stretchability . 0) (padding . 0.2) (minimum-distance . 2.8))`.
- Set grob-property `nonstaff-relatedstaff-spacing` in Section 3.1.126 [VerticalAxisGroup], page 373 to `'((space . 5.5) (stretchability . 1) (padding . 0.5))`.
- Set grob-property `nonstaff-unrelatedstaff-spacing padding` in Section 3.1.126 [VerticalAxisGroup], page 373 to `1.5`.
- Set grob-property `remove-empty` in Section 3.1.126 [VerticalAxisGroup], page 373 to `#t`.
- Set grob-property `remove-first` in Section 3.1.126 [VerticalAxisGroup], page 373 to `#t`.
- Set grob-property `self-alignment-Y` in Section 3.1.47 [InstrumentName], page 308 to `#f`.
- Set grob-property `staff-affinity` in Section 3.1.126 [VerticalAxisGroup], page 373 to `1`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `shortInstrumentName` to `'()`.

This context is a ‘bottom’ context; it cannot contain other contexts.

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

`Section 2.2.32 [Extender_engraver], page 228`
Create lyric extenders.

Music types accepted:

Section 1.2.15 [completize-extender-event], page 39 and Section 1.2.20 [extender-event], page 40

Properties (read)

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

`includeGraceNotes` (boolean)
Do not ignore grace notes for Section “Lyrics” in *Internals Reference*.

This engraver creates the following layout object(s):

Section 3.1.56 [LyricExtender], page 315.

Section 2.2.36 [Font_size_engraver], page 230

Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.46 [Hara_kiri_engraver], page 233

Like `Axis_group_engraver`, but make a hara-kiri spanner, and add interesting items (i.e., note heads, lyric syllables, and normal rests).

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.48 [Hyphen_engraver], page 233

Create lyric hyphens and distance constraints between words.

Music types accepted:

Section 1.2.24 [hyphen-event], page 40

This engraver creates the following layout object(s):

Section 3.1.57 [LyricHyphen], page 316 and Section 3.1.58 [LyricSpace], page 317.

Section 2.2.49 [Instrument_name_engraver], page 234

Create a system start text for instrument or vocal names.

Properties (read)

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

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

`shortInstrumentName` (markup)
: See `instrumentName`.

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

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308.

Section 2.2.57 [Lyric_engraver], page 236
: Engrave text for lyrics.

  Music types accepted:

  Section 1.2.31 [lyric-event], page 41

  Properties (read)

  `ignoreMelismata` (boolean)
  : Ignore melismata for this Section "Lyrics" in *Internals Reference* line.

  `includeGraceNotes` (boolean)
  : Do not ignore grace notes for Section "Lyrics" in *Internals Reference*.

  `lyricMelismaAlignment` (direction)
  : Alignment to use for a melisma syllable.

  This engraver creates the following layout object(s):

  Section 3.1.59 [LyricText], page 317.

Section 2.2.106 [Stanza_number_engraver], page 251
: Engrave stanza numbers.

  Properties (read)

  `stanza` (markup)
  : Stanza 'number' to print before the start of a verse. Use in `Lyrics` context.

  This engraver creates the following layout object(s):

  Section 3.1.98 [StanzaNumber], page 348.

### 2.1.15 MensuralStaff

Same as `Staff` context, except that it is accommodated for typesetting a piece in mensural style.

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

Staff.

This context creates the following layout object(s):

Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.3 [AccidentalPlacement], page 271, Section 3.1.4 [AccidentalSuggestion], page 272, Section 3.1.11 [BarLine], page 277, Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.15 [BassFigureAlignmentPositioning], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282, Section 3.1.18 [BassFigureLine], page 283, Section 3.1.25 [Clef], page 288, Section 3.1.29 [Custos], page 292, Section 3.1.30 [DotColumn], page 292, Section 3.1.47 [InstrumentName], page 308, Section 3.1.49 [KeyCancellation], page 310, Section 3.1.50 [KeySignature], page 311, Section 3.1.53 [LedgerLineSpanner], page 313, Section 3.1.68 [NoteCollision], page 325, Section 3.1.73 [OctavateEight], page 328, Section 3.1.74 [OttavaBracket], page 329, Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.86 [RestCollision], page 339, Section 3.1.89 [ScriptRow], page 341, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.96 [StaffSpacing], page 347, Section 3.1.97 [StaffSymbol], page 347, Section 3.1.103 [SustainPedal], page 353, Section 3.1.104 [SustainPedalLineSpanner], page 354, Section 3.1.115 [TimeSignature], page 364, Section 3.1.122 [UnaCordaPedal], page 371, Section 3.1.123 [UnaCordaPedalLineSpanner], page 372 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set grob-property `glyph-name-alist` in Section 3.1.1 [Accidental], page 270 to `'((-1/2 . accidentals.mensuralM1) (0 . accidentals.vaticana0) (1/2 . accidentals.mensural1))`.
- Set grob-property `glyph-name-alist` in Section 3.1.50 [KeySignature], page 311 to `'((-1/2 . accidentals.mensuralM1) (0 . accidentals.vaticana0) (1/2 . accidentals.mensural1))`.
- Set grob-property `neutral-direction` in Section 3.1.29 [Custos], page 292 to `-1`.
- Set grob-property `neutral-position` in Section 3.1.29 [Custos], page 292 to `3`.
- Set grob-property `style` in Section 3.1.29 [Custos], page 292 to `'mensural`.
- Set grob-property `style` in Section 3.1.115 [TimeSignature], page 364 to `'mensural`.
- Set grob-property `thickness` in Section 3.1.97 [StaffSymbol], page 347 to `0.6`.
- Set grob-property `transparent` in Section 3.1.11 [BarLine], page 277 to `#t`.
- Set translator property `autoAccidentals` to `'(Staff #<procedure #f (context pitch barnum measurepos)>)`.
- Set translator property `autoCautionaries` to `'()`.
- Set translator property `clefGlyph` to `"clefs.mensural.g"`.
- Set translator property `clefOctavation` to `0`.
- Set translator property `clefPosition` to `-2`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `extraNatural` to `#f`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localKeySignature` to `'()`.
- Set translator property `middleCClefPosition` to `-6`.
- Set translator property `middleCPosition` to `-6`.
- Set translator property `printKeyCancellation` to `#f`.
- Set translator property `shortInstrumentName` to `'()`.

Context MensuralStaff can contain Section 2.1.3 [CueVoice], page 54 and Section 2.1.16 [MensuralVoice], page 125.

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

Section 2.2.1 [Accidental_engraver], page 217

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)

`autoAccidentals` (list)

List of different ways to typeset an accidental.

For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used.

Each entry in the list is either a symbol or a procedure.

*symbol* The symbol is the name of the context in which the following rules are

to be applied. For example, if *context* is Section "Score" in *Internals Reference* then all staves share accidentals, and if *context* is Section "Staff" in *Internals Reference* then all voices in the same staff share accidentals, but staves do not.

*procedure* The procedure represents an accidental rule to be applied to the previously specified context.

The procedure takes the following arguments:

`context` The current context to which the rule should be applied.

`pitch` The pitch of the note to be evaluated.

`barnum` The current bar number.

`measurepos` The current measure position.

The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. `(#t . #f)` does not make sense.

`autoCautionaries` (list)
List similar to `autoAccidentals`, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

`extraNatural` (boolean)
Whether to typeset an extra natural sign before accidentals changing from a non-natural to another non-natural.

`harmonicAccidentals` (boolean)
If set, harmonic notes in chords get accidentals.

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

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`localKeySignature` (list)
: The key signature at this point in the measure. The format is the same as for `keySignature`, but can also contain ((*octave* . *name*) . (*alter barnumber* . *measureposition*)) pairs.

Properties (write)

`localKeySignature` (list)
: The key signature at this point in the measure. The format is the same as for `keySignature`, but can also contain ((*octave* . *name*) . (*alter barnumber* . *measureposition*)) pairs.

This engraver creates the following layout object(s):

Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.3 [AccidentalPlacement], page 271 and Section 3.1.4 [AccidentalSuggestion], page 272.

Section 2.2.5 [Axis_group_engraver], page 220

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

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.7 [Bar_engraver], page 220

Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point.

Properties (read)

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

  ```
  \set Staff.whichBar = "|:"
  ```

  This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.11 [BarLine], page 277.

Section 2.2.16 [Clef_engraver], page 224
Determine and set reference point for pitches.

Properties (read)

`clefGlyph` (string)
Name of the symbol within the music font.

`clefOctavation` (integer)
Add this much extra octavation. Values of 7 and -7 are common.

`clefPosition` (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`explicitClefVisibility` (vector)
'`break-visibility`' function for clef changes.

`forceClef` (boolean)
Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):

Section 3.1.25 [Clef], page 288 and Section 3.1.73 [OctavateEight], page 328.

Section 2.2.18 [Collision_engraver], page 224
Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s):

Section 3.1.68 [NoteCollision], page 325.

Section 2.2.21 [Custos_engraver], page 225
Engrave custodes.

This engraver creates the following layout object(s):

Section 3.1.29 [Custos], page 292.

Section 2.2.23 [Dot_column_engraver], page 226
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s):

Section 3.1.30 [DotColumn], page 292.

Section 2.2.33 [Figured_bass_engraver], page 229
Make figured bass numbers.

Music types accepted:

Section 1.2.6 [bass-figure-event], page 38 and Section 1.2.48 [rest-event], page 43

Properties (read)

`figuredBassAlterationDirection` (direction)
Where to put alterations relative to the main figure.

`figuredBassCenterContinuations` (boolean)
: Whether to vertically center pairs of extender lines. This does not work with three or more lines.

`figuredBassFormatter` (procedure)
: A routine generating a markup for a bass figure.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):

Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282 and Section 3.1.18 [BassFigureLine], page 283.

Section 2.2.34 [Figured_bass_position_engraver], page 229
Position figured bass alignments over notes.

This engraver creates the following layout object(s):

Section 3.1.15 [BassFigureAlignmentPositioning], page 281.

Section 2.2.36 [Font_size_engraver], page 230
Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.45 [Grob_pq_engraver], page 233
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.49 [Instrument_name_engraver], page 234
Create a system start text for instrument or vocal names.

Properties (read)

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

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

`shortInstrumentName` (markup)
: See `instrumentName`.

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

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308.

Section 2.2.52 [Key_engraver], page 235
Engrave a key signature.

Music types accepted:

Section 1.2.25 [key-change-event], page 40

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 changing from a non-natural to another non-natural.

`keyAlterationOrder` (list)
: An alist that defines in what order alterations should be printed. The format is `(`*`step . alter`*`)`, where *step* is a number from 0 to 6 and *alter* from -2 (sharp) to 2 (flat).

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`lastKeySignature` (list)
: Last key signature before a key signature change.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`lastKeySignature` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
: The tonic of the current scale.

This engraver creates the following layout object(s):

Section 3.1.49 [KeyCancellation], page 310 and Section 3.1.50 [KeySignature], page 311.

Section 2.2.55 [Ledger_line_engraver], page 236
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):

Section 3.1.53 [LedgerLineSpanner], page 313.

Section 2.2.72 [Ottava_spanner_engraver], page 241
: Create a text spanner when the ottavation property changes.

Properties (read)

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

`middleCOffset` (number)
: The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):

Section 3.1.74 [OttavaBracket], page 329.

Section 2.2.73 [Output_property_engraver], page 242
: Apply a procedure to any grob acknowledged.

  Music types accepted:

  Section 1.2.3 [apply-output-event], page 38

Section 2.2.80 [Piano_pedal_align_engraver], page 244
: Align piano pedal symbols and brackets.

  Properties (read)

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

  This engraver creates the following layout object(s):

  Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.104 [SustainPedalLineSpanner], page 354 and Section 3.1.123 [UnaCordaPedalLineSpanner], page 372.

Section 2.2.81 [Piano_pedal_engraver], page 245
: Engrave piano pedal symbols and brackets.

  Music types accepted:

  Section 1.2.55 [sostenuto-event], page 44, Section 1.2.63 [sustain-event], page 46 and Section 1.2.71 [una-corda-event], page 46

  Properties (read)

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

  `pedalSostenutoStrings` (list)
  : See `pedalSustainStrings`.

  `pedalSostenutoStyle` (symbol)
  : See `pedalSustainStyle`.

  `pedalSustainStrings` (list)
  : A list of strings to print for sustain-pedal. Format is `(up updown down)`, where each of the three is the string to print when this is done with the pedal.

  `pedalSustainStyle` (symbol)
  : A symbol that indicates how to print sustain pedals: `text`, `bracket` or `mixed` (both).

  `pedalUnaCordaStrings` (list)
  : See `pedalSustainStrings`.

  `pedalUnaCordaStyle` (symbol)
  : See `pedalSustainStyle`.

  This engraver creates the following layout object(s):

  Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.103 [SustainPedal], page 353 and Section 3.1.122 [UnaCordaPedal], page 371.

Section 2.2.87 [Rest_collision_engraver], page 246
Handle collisions of rests.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.86 [RestCollision], page 339.

Section 2.2.93 [Script_row_engraver], page 248
Determine order in horizontal side position elements.

This engraver creates the following layout object(s):

Section 3.1.89 [ScriptRow], page 341.

Section 2.2.94 [Separating_line_group_engraver], page 248
Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.96 [StaffSpacing], page 347.

Section 2.2.102 [Staff_collecting_engraver], page 250
Maintain the stavesFound variable.

Properties (read)

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

Properties (write)

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

Section 2.2.104 [Staff_symbol_engraver], page 251
Create the constellation of five (default) staff lines.

Music types accepted:

Section 1.2.59 [staff-span-event], page 45

This engraver creates the following layout object(s):

Section 3.1.97 [StaffSymbol], page 347.

Section 2.2.117 [Time_signature_engraver], page 255
Create a Section 3.1.115 [TimeSignature], page 364 whenever timeSignatureFraction changes.

Properties (read)

`implicitTimeSignatureVisibility` (vector)
: break visibility for the default time signature.

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

This engraver creates the following layout object(s):

Section 3.1.115 [TimeSignature], page 364.

### 2.1.16 MensuralVoice

Same as `Voice` context, except that it is accommodated for typesetting a piece in mensural style.

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

Voice.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276, Section 3.1.19 [Beam], page 283, Section 3.1.20 [BendAfter], page 285, Section 3.1.23 [BreathingSign], page 287, Section 3.1.26 [ClusterSpanner], page 289, Section 3.1.27 [ClusterSpannerBeacon], page 290, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.31 [Dots], page 293, Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.38 [Fingering], page 300, Section 3.1.40 [Glissando], page 303, Section 3.1.44 [Hairpin], page 305, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.51 [LaissezVibrerTie], page 312, Section 3.1.52 [LaissezVibrerTieColumn], page 313, Section 3.1.62 [MensuralLigature], page 319, Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.69 [NoteColumn], page 326, Section 3.1.70 [NoteHead], page 326, Section 3.1.72 [NoteSpacing], page 327, Section 3.1.77 [PercentRepeat], page 331, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.79 [PhrasingSlur], page 333, Section 3.1.82 [RepeatSlash], page 337, Section 3.1.83 [RepeatTie], page 337, Section 3.1.84 [RepeatTieColumn], page 338, Section 3.1.85 [Rest], page 339, Section 3.1.87 [Script], page 339, Section 3.1.88 [ScriptColumn], page 340, Section 3.1.99 [Stem], page 348, Section 3.1.100 [StemTremolo], page 350, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352, Section 3.1.111 [TextScript], page 360, Section 3.1.112 [TextSpanner], page 361, Section 3.1.113 [Tie], page 362, Section 3.1.114 [TieColumn], page 364, Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.118 [TrillPitchHead], page 367, Section 3.1.119 [TrillSpanner], page 368, Section 3.1.120 [TupletBracket], page 369, Section 3.1.121 [TupletNumber], page 370 and Section 3.1.127 [VoiceFollower], page 375.

This context sets the following properties:

- Set grob-property `style` in Section 3.1.70 [NoteHead], page 326 to `'mensural`.
- Set grob-property `style` in Section 3.1.85 [Rest], page 339 to `'mensural`.
- Set translator property `autoBeaming` to `#f`.
- Set translator property `localKeySignature` to `'()`.

This context is a 'bottom' context; it cannot contain other contexts.

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

`Section 2.2.3 [Arpeggio_engraver], page 219`
: Generate an Arpeggio symbol.

  Music types accepted:

Section 1.2.4 [arpeggio-event], page 38

This engraver creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276.

`Section 2.2.4 [Auto_beam_engraver], page 219`

Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.107 [Stem_engraver], page 251 properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted:

Section 1.2.8 [beam-forbid-event], page 39

Properties (read)

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

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.9 [Beam_engraver], page 221`

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

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.11 [Bend_engraver], page 222`
Create fall spanners.

Music types accepted:

Section 1.2.9 [bend-after-event], page 39

This engraver creates the following layout object(s):

Section 3.1.20 [BendAfter], page 285.

`Section 2.2.13 [Breathing_sign_engraver], page 223`
Create a breathing sign.

Music types accepted:

Section 1.2.13 [breathing-event], page 39

This engraver creates the following layout object(s):

Section 3.1.23 [BreathingSign], page 287.

`Section 2.2.15 [Chord_tremolo_engraver], page 223`
Generate beams for tremolo repeats.

Music types accepted:

Section 1.2.68 [tremolo-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.17 [Cluster_spanner_engraver], page 224`
Engrave a cluster using `Spanner` notation.

Music types accepted:

Section 1.2.14 [cluster-note-event], page 39

This engraver creates the following layout object(s):

Section 3.1.26 [ClusterSpanner], page 289 and Section 3.1.27 [ClusterSpannerBeacon], page 290.

`Section 2.2.24 [Dots_engraver], page 226`
Create Section 3.1.31 [Dots], page 293 objects for Section 3.2.82 [rhythmic-head-interface], page 419s.

This engraver creates the following layout object(s):

Section 3.1.31 [Dots], page 293.

`Section 2.2.27 [Dynamic_align_engraver], page 227`
Align hairpins and dynamic texts on a horizontal line.

Music types accepted:

Section 1.2.12 [break-span-event], page 39

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.34 [DynamicLineSpanner], page 296.

Section 2.2.35 [Fingering_engraver], page 229
: Create fingering scripts.

Music types accepted:

Section 1.2.21 [fingering-event], page 40 and Section 1.2.62 [stroke-finger-event], page 45

This engraver creates the following layout object(s):

Section 3.1.38 [Fingering], page 300.

Section 2.2.36 [Font_size_engraver], page 230
: Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.37 [Forbid_line_break_engraver], page 230
: Forbid line breaks when note heads are still playing at some point.

Properties (read)

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

Properties (write)

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

Section 2.2.39 [Glissando_engraver], page 231
: Engrave glissandi.

Music types accepted:

Section 1.2.22 [glissando-event], page 40

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303.

Section 2.2.40 [Grace_beam_engraver], page 231
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.41 [Grace_engraver], page 232
: Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

Section 2.2.45 [Grob_pq_engraver], page 233
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.50 [Instrument_switch_engraver], page 234
: Create a cue text for taking instrument.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.48 [InstrumentSwitch], page 309.

Section 2.2.54 [Laissez_vibrer_engraver], page 236
: Create laissez vibrer items.

Music types accepted:

Section 1.2.27 [laissez-vibrer-event], page 40

This engraver creates the following layout object(s):

Section 3.1.51 [LaissezVibrerTie], page 312 and Section 3.1.52 [LaissezVibrerTieColumn], page 313.

Section 2.2.62 [Mensural_ligature_engraver], page 238

Handle `Mensural_ligature_events` by glueing special ligature heads together.

Music types accepted:

Section 1.2.29 [ligature-event], page 41

This engraver creates the following layout object(s):

Section 3.1.62 [MensuralLigature], page 319.

Section 2.2.64 [Multi_measure_rest_engraver], page 238

Engrave multi-measure rests that are produced with 'R'. It reads `measurePosition` and `internalBarNumber` to determine what number to print over the Section 3.1.64 [MultiMeasureRest], page 321. Reads `measureLength` to determine whether it should use a whole rest or a breve rest to represent one measure.

Music types accepted:

Section 1.2.34 [multi-measure-rest-event], page 41 and Section 1.2.35 [multi-measure-text-event], page 41

Properties (read)

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

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322 and Section 3.1.66 [MultiMeasureRestText], page 323.

Section 2.2.65 [New_dynamic_engraver], page 239

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:

Section 1.2.1 [absolute-dynamic-event], page 38 and Section 1.2.57 [span-dynamic-event], page 44

Properties (read)

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

`crescendoText` (markup)
: The text to print at start of non-hairpin crescendo, i.e., '`cresc.`'.

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

`decrescendoSpanner` (symbol)
: The type of spanner to be used for decrescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin decrescendo is used.

`decrescendoText` (markup)
: The text to print at start of non-hairpin decrescendo, i.e., '`dim.`'.

This engraver creates the following layout object(s):

Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298 and Section 3.1.44 [Hairpin], page 305.

`Section 2.2.66 [New_fingering_engraver], page 240`

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

Properties (read)

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

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

`stringNumberOrientations` (list)
: See `fingeringOrientations`.

`strokeFingerOrientations` (list)
: See `fingeringOrientations`.

This engraver creates the following layout object(s):

Section 3.1.38 [Fingering], page 300, Section 3.1.87 [Script], page 339, Section 3.1.101 [StringNumber], page 351 and Section 3.1.102 [StrokeFinger], page 352.

Section 2.2.67 [Note_head_line_engraver], page 240
Engrave a line between two note heads, for example a glissando. If `followVoice` is set, staff switches also generate a line.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303 and Section 3.1.127 [VoiceFollower], page 375.

Section 2.2.68 [Note_heads_engraver], page 240
Generate note heads.

Music types accepted:

Section 1.2.37 [note-event], page 42

Properties (read)

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

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

This engraver creates the following layout object(s):

Section 3.1.70 [NoteHead], page 326.

Section 2.2.71 [Note_spacing_engraver], page 241
Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):

Section 3.1.72 [NoteSpacing], page 327.

Section 2.2.73 [Output_property_engraver], page 242
Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

Section 2.2.77 [Part_combine_engraver], page 243
Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted:

Section 1.2.41 [part-combine-event], page 42

Properties (read)

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

`printPartCombineTexts` (boolean)
Set 'Solo' and 'A due' texts in the part combiner?

`soloIIText` (markup)
: The text for the start of a solo for voice 'two' when part-combining.

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

This engraver creates the following layout object(s):

Section 3.1.28 [CombineTextScript], page 290.

`Section 2.2.78 [Percent_repeat_engraver], page 243`

Make whole bar and double bar repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.77 [PercentRepeat], page 331 and Section 3.1.78 [PercentRepeatCounter], page 332.

`Section 2.2.79 [Phrasing_slur_engraver], page 244`

Print phrasing slurs. Similar to Section 2.2.96 [Slur_engraver], page 249.

Music types accepted:

Section 1.2.46 [phrasing-slur-event], page 43

This engraver creates the following layout object(s):

Section 3.1.79 [PhrasingSlur], page 333.

`Section 2.2.84 [Pitched_trill_engraver], page 246`

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

This engraver creates the following layout object(s):

Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366 and Section 3.1.118 [TrillPitchHead], page 367.

Section 2.2.86 [Repeat_tie_engraver], page 246
Create repeat ties.

Music types accepted:

Section 1.2.47 [repeat-tie-event], page 43

This engraver creates the following layout object(s):

Section 3.1.83 [RepeatTie], page 337 and Section 3.1.84 [RepeatTieColumn], page 338.

Section 2.2.88 [Rest_engraver], page 247
Engrave rests.

Music types accepted:

Section 1.2.48 [rest-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.85 [Rest], page 339.

Section 2.2.89 [Rhythmic_column_engraver], page 247
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s):

Section 3.1.69 [NoteColumn], page 326.

Section 2.2.91 [Script_column_engraver], page 247
Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s):

Section 3.1.88 [ScriptColumn], page 340.

Section 2.2.92 [Script_engraver], page 248
Handle note scripted articulations.

Music types accepted:

Section 1.2.5 [articulation-event], page 38

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.87 [Script], page 339.

Section 2.2.95 [Slash_repeat_engraver], page 249
Make beat repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.82 [RepeatSlash], page 337.

`Section 2.2.101 [Spanner_break_forbid_engraver], page 250`
Forbid breaks in certain spanners.

`Section 2.2.107 [Stem_engraver], page 251`
Create stems and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:

Section 1.2.67 [tremolo-event], page 46

Properties (read)

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

`stemRightBeamCount` (integer)
: See `stemLeftBeamCount`.

`tremoloFlags` (integer)
: The number of tremolo flags to add if no number is specified.

This engraver creates the following layout object(s):

Section 3.1.99 [Stem], page 348 and Section 3.1.100 [StemTremolo], page 350.

`Section 2.2.113 [Text_engraver], page 254`
Create text scripts.

Music types accepted:

Section 1.2.64 [text-script-event], page 46

This engraver creates the following layout object(s):

Section 3.1.111 [TextScript], page 360.

`Section 2.2.114 [Text_spanner_engraver], page 254`
Create text spanner from an event.

Music types accepted:

Section 1.2.65 [text-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.112 [TextSpanner], page 361.

`Section 2.2.115 [Tie_engraver], page 254`
Generate ties between note heads of equal pitch.

Music types accepted:

Section 1.2.66 [tie-event], page 46

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.

This engraver creates the following layout object(s):

Section 3.1.113 [Tie], page 362 and Section 3.1.114 [TieColumn], page 364.

`Section 2.2.121 [Trill_spanner_engraver], page 256`
Create trill spanner from an event.

Music types accepted:

Section 1.2.69 [trill-span-event], page 46

Properties (read)

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

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

This engraver creates the following layout object(s):

Section 3.1.119 [TrillSpanner], page 368.

`Section 2.2.122 [Tuplet_engraver], page 256`
Catch tuplet events and generate appropriate bracket.

Music types accepted:

Section 1.2.70 [tuplet-span-event], page 46

Properties (read)

`tupletFullLength` (boolean)
: If set, the tuplet is printed up to the start of the next note.

`tupletFullLengthNote` (boolean)
: If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

This engraver creates the following layout object(s):

Section 3.1.120 [TupletBracket], page 369 and Section 3.1.121 [TupletNumber], page 370.

`Section 2.2.123 [Tweak_engraver], page 257`
Read the `tweaks` property from the originating event, and set properties.

### 2.1.17 NoteNames

A context for printing the names of notes.

This context creates the following layout object(s):

Section 3.1.71 [NoteName], page 327, Section 3.1.96 [StaffSpacing], page 347, Section 3.1.113 [Tie], page 362, Section 3.1.114 [TieColumn], page 364 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set grob-property `staff-affinity` in Section 3.1.126 [VerticalAxisGroup], page 373 to `-1`.

This context is a 'bottom' context; it cannot contain other contexts.

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

Section 2.2.5 [Axis_group_engraver], page 220
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

  Properties (read)

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

  This engraver creates the following layout object(s):

  Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.69 [Note_name_engraver], page 241
: Print pitches as words.

  Music types accepted:

  Section 1.2.37 [note-event], page 42

  Properties (read)

  `printOctaveNames` (boolean)
  : Print octave marks for the `NoteNames` context.

  This engraver creates the following layout object(s):

  Section 3.1.71 [NoteName], page 327.

Section 2.2.94 [Separating_line_group_engraver], page 248
: Generate objects for computing spacing parameters.

  Properties (read)

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

  Properties (write)

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

  This engraver creates the following layout object(s):

  Section 3.1.96 [StaffSpacing], page 347.

Section 2.2.115 [Tie_engraver], page 254
: Generate ties between note heads of equal pitch.

  Music types accepted:

  Section 1.2.66 [tie-event], page 46

  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.

  This engraver creates the following layout object(s):

  Section 3.1.113 [Tie], page 362 and Section 3.1.114 [TieColumn], page 364.

### 2.1.18 PianoStaff

Just like `GrandStaff` but with support for instrument names at the start of each system.

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

GrandStaff.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276, Section 3.1.47 [InstrumentName], page 308, Section 3.1.94 [SpanBar], page 345, Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357, Section 3.1.109 [SystemStartSquare], page 358 and Section 3.1.125 [VerticalAlignment], page 373.

This context sets the following properties:

- Set translator property `instrumentName` to `'()`.
- Set translator property `localKeySignature` to `'()`.
- Set translator property `shortInstrumentName` to `'()`.
- Set translator property `systemStartDelimiter` to `'SystemStartBrace`.
- Set translator property `topLevelAlignment` to `#f`.
- Set translator property `topLevelAlignment` to `#f`.

Context PianoStaff can contain Section 2.1.7 [Dynamics], page 83, Section 2.1.8 [FiguredBass], page 86 and Section 2.1.21 [Staff], page 155.

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

Section 2.2.49 [Instrument_name_engraver], page 234
: Create a system start text for instrument or vocal names.

  Properties (read)

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

  `instrumentName` (markup)
  : The name to print left of a staff. The `instrumentName` property labels

the staff in the first system, and the `shortInstrumentName` property labels following lines.

`shortInstrumentName` (markup)
See `instrumentName`.

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

`vocalName` (markup)
Name of a vocal line.

This engraver creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308.

`Section 2.2.51 [Keep_alive_together_engraver], page 234`
This engraver collects all `Hara_kiri_group_spanner`s that are created in contexts at or below its own. These spanners are then tied together so that one will be removed only if all are removed. For example, if a `StaffGroup` uses this engraver, then the staves in the group will all be visible as long as there is a note in at least one of them.

`Section 2.2.99 [Span_arpeggio_engraver], page 250`
Make arpeggios that span multiple staves.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276.

`Section 2.2.100 [Span_bar_engraver], page 250`
Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.

This engraver creates the following layout object(s):

Section 3.1.94 [SpanBar], page 345.

`Section 2.2.108 [System_start_delimiter_engraver], page 252`
Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

Properties (read)

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

`systemStartDelimiter` (symbol)
Which grob to make for the start of the system/staff? Set to `SystemStartBrace`, `SystemStartBracket` or `SystemStartBar`.

`systemStartDelimiterHierarchy` (pair)
A nested list, indicating the nesting of a start delimiters.

This engraver creates the following layout object(s):

Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357 and Section 3.1.109 [SystemStartSquare], page 358.

Section 2.2.125 [Vertical_align_engraver], page 257

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.

This engraver creates the following layout object(s):

Section 3.1.125 [VerticalAlignment], page 373.

### 2.1.19 RhythmicStaff

A context like `Staff` but for printing rhythms. Pitches are ignored; the notes are printed on one line.

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

Staff.

This context creates the following layout object(s):

Section 3.1.11 [BarLine], page 277, Section 3.1.30 [DotColumn], page 292, Section 3.1.47 [InstrumentName], page 308, Section 3.1.53 [LedgerLineSpanner], page 313, Section 3.1.96 [StaffSpacing], page 347, Section 3.1.97 [StaffSymbol], page 347, Section 3.1.115 [TimeSignature], page 364 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set grob-property `bar-size` in Section 3.1.11 [BarLine], page 277 to `4`.
- Set grob-property `line-count` in Section 3.1.97 [StaffSymbol], page 347 to `1`.
- Set grob-property `neutral-direction` in Section 3.1.19 [Beam], page 283 to `1`.
- Set grob-property `neutral-direction` in Section 3.1.99 [Stem], page 348 to `1`.
- Set grob-property `staff-padding` in Section 3.1.128 [VoltaBracket], page 376 to `3`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `localKeySignature` to `'()`.
- Set translator property `squashedPosition` to `0`.

Context RhythmicStaff can contain Section 2.1.3 [CueVoice], page 54 and Section 2.1.27 [Voice], page 205.

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

Section 2.2.5 [Axis_group_engraver], page 220

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

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.7 [Bar_engraver], page 220

Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point.

Properties (read)

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

  ```
  \set Staff.whichBar = "|:"
  ```

  This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.11 [BarLine], page 277.

Section 2.2.23 [Dot_column_engraver], page 226

Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s):

Section 3.1.30 [DotColumn], page 292.

Section 2.2.36 [Font_size_engraver], page 230

Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.49 [Instrument_name_engraver], page 234

Create a system start text for instrument or vocal names.

Properties (read)

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

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

`shortInstrumentName` (markup)
: See `instrumentName`.

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

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308.

Section 2.2.55 [Ledger_line_engraver], page 236
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):

Section 3.1.53 [LedgerLineSpanner], page 313.

Section 2.2.73 [Output_property_engraver], page 242
: Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

Section 2.2.83 [Pitch_squash_engraver], page 245
: Set the vertical position of note heads to `squashedPosition`, if that property is set. This can be used to make a single-line staff demonstrating the rhythm of a melody.

Properties (read)

`squashedPosition` (integer)
: Vertical position of squashing for Section "Pitch_squash_engraver" in *Internals Reference*.

Section 2.2.94 [Separating_line_group_engraver], page 248
: Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.96 [StaffSpacing], page 347.

Section 2.2.104 [Staff_symbol_engraver], page 251
: Create the constellation of five (default) staff lines.

Music types accepted:

Section 1.2.59 [staff-span-event], page 45

This engraver creates the following layout object(s):

Section 3.1.97 [StaffSymbol], page 347.

Section 2.2.117 [Time_signature_engraver], page 255
: Create a Section 3.1.115 [TimeSignature], page 364 whenever `timeSignatureFraction` changes.

  Properties (read)

  `implicitTimeSignatureVisibility` (vector)
  : break visibility for the default time signature.

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

  This engraver creates the following layout object(s):

  Section 3.1.115 [TimeSignature], page 364.

### 2.1.20 Score

This is the top level notation context. No other context can contain a `Score` context. This context handles the administration of time signatures. It also makes sure that items such as clefs, time signatures, and key-signatures are aligned across staves.

You cannot explicitly instantiate a `Score` context (since it is not contained in any other context). It is instantiated automatically when an output definition (a `\score` or `\layout` block) is processed.

This context creates the following layout object(s):

Section 3.1.12 [BarNumber], page 279, Section 3.1.21 [BreakAlignGroup], page 285, Section 3.1.22 [BreakAlignment], page 286, Section 3.1.41 [GraceSpacing], page 304, Section 3.1.54 [LeftEdge], page 314, Section 3.1.63 [MetronomeMark], page 320, Section 3.1.67 [NonMusicalPaperColumn], page 324, Section 3.1.75 [PaperColumn], page 330, Section 3.1.76 [ParenthesesItem], page 331, Section 3.1.81 [RehearsalMark], page 335, Section 3.1.93 [SpacingSpanner], page 344, Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357, Section 3.1.109 [SystemStartSquare], page 358, Section 3.1.125 [VerticalAlignment], page 373, Section 3.1.128 [VoltaBracket], page 376 and Section 3.1.129 [VoltaBracketSpanner], page 376.

This context sets the following properties:

- Set translator property `aDueText` to `"a2"`.
- Set translator property `autoAccidentals` to `'(Staff #<procedure #f (context pitch barnum measurepos)>)`.
- Set translator property `autoBeamCheck` to `default-auto-beam-check`.
- Set translator property `autoBeaming` to `#t`.
- Set translator property `autoCautionaries` to `'()`.
- Set translator property `automaticBars` to `#t`.
- Set translator property `barCheckSynchronize` to `#f`.
- Set translator property `barNumberVisibility` to `first-bar-number-invisible`.
- Set translator property `baseMoment` to `#<Mom 1/4>`.
- Set translator property `bassStaffProperties` to `'((assign clefGlyph clefs.F) (assign clefPosition 2) (assign middleCPosition 6) (assign middleCClefPosition 6))`.
- Set translator property `beamExceptions` to `'((end ((1 . 8) 4 4) ((1 . 12) 3 3 3 3)))`.
- Set translator property `beatStructure` to `'(1 1 1 1)`.

- Set translator property `chordNameExceptionsFull` to `'(((#<Pitch c' > #<Pitch e' > #<Pitch gis' >) (#<procedure line-markup (layout props args)> (+))) ((#<Pitch c' > #<Pitch ees' > #<Pitch ges' >) (#<procedure line-markup (layout props args)> ((#<procedure super-markup (layout props arg)> o)))) ((#<Pitch c' > #<Pitch ees' > #<Pitch ges' > #<Pitch bes' >) (#<procedure line-markup (layout props args)> ((#<procedure super-markup (layout props arg)> )))) ((#<Pitch c' > #<Pitch ees' > #<Pitch ges' > #<Pitch beses' >) (#<procedure line-markup (layout props args)> ((#<procedure super-markup (layout props arg)> o7))))).`
- Set translator property `chordNameExceptionsPartial` to `'(((#<Pitch c' > #<Pitch d' >) (#<procedure line-markup (layout props args)> ((#<procedure normal-size-super-markup (layout props arg)> 2)))) ((#<Pitch c' > #<Pitch ees' >) (#<procedure line-markup (layout props args)> (m))) ((#<Pitch c' > #<Pitch f' >) (#<procedure line-markup (layout props args)> ((#<procedure normal-size-super-markup (layout props arg)> sus4)))) ((#<Pitch c' > #<Pitch g' >) (#<procedure line-markup (layout props args)> ((#<procedure normal-size-super-markup (layout props arg)> 5)))) ((#<Pitch c' > #<Pitch ees' > #<Pitch f' >) (#<procedure line-markup (layout props args)> (m)) (#<procedure line-markup (layout props args)> ((#<procedure normal-size-super-markup (layout props arg)> sus4)))) ((#<Pitch c' > #<Pitch d' > #<Pitch ees' >) (#<procedure line-markup (layout props args)> (m)) (#<procedure line-markup (layout props args)> ((#<procedure normal-size-super-markup (layout props arg)> sus2))))).`
- Set translator property `chordNameExceptions` to `'(((#<Pitch e' > #<Pitch gis' >) #<procedure line-markup (layout props args)> (+)) ((#<Pitch ees' > #<Pitch ges' >) #<procedure line-markup (layout props args)> ((#<procedure super-markup (layout props arg)> o))) ((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >) #<procedure line-markup (layout props args)> ((#<procedure super-markup (layout props arg)> ))) ((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >) #<procedure line-markup (layout props args)> ((#<procedure super-markup (layout props arg)> o7)))).`
- Set translator property `chordNameFunction` to `ignatzek-chord-names`.
- Set translator property `chordNameLowercaseMinor` to `#f`.
- Set translator property `chordNameSeparator` to `'(#<procedure simple-markup (layout props str)> /)`.
- Set translator property `chordNoteNamer` to `'()`.
- Set translator property `chordPrefixSpacer` to `0`.
- Set translator property `chordRootNamer` to `note-name->markup`.
- Set translator property `clefGlyph` to `"clefs.G"`.
- Set translator property `clefPosition` to `-2`.
- Set translator property `crescendoSpanner` to `'hairpin`.
- Set translator property `decrescendoSpanner` to `'hairpin`.
- Set translator property `defaultBarType` to `"|"`.
- Set translator property `doubleRepeatType` to `":|:"`.
- Set translator property `drumStyleTable` to `#<hash-table 29/61>`.
- Set translator property `explicitClefVisibility` to `#(#t #t #t)`.
- Set translator property `explicitKeySignatureVisibility` to `#(#t #t #t)`.
- Set translator property `extraNatural` to `#t`.
- Set translator property `figuredBassFormatter` to `format-bass-figure`.
- Set translator property `fingeringOrientations` to `'(up down)`.

- Set translator property `firstClef` to `#t`.
- Set translator property `graceSettings` to `'((Voice Stem direction 1) (Voice Stem 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 Slur direction -1) (Voice Script font-size -3) (Voice Fingering font-size -8) (Voice StringNumber font-size -8))`.
- Set translator property `harmonicAccidentals` to `#t`.
- Set translator property `highStringOne` to `#t`.
- Set translator property `implicitTimeSignatureVisibility` to `#(#f #t #t)`.
- Set translator property `instrumentTransposition` to `#<Pitch c' >`.
- Set translator property `keepAliveInterfaces` to `'(bass-figure-interface chord-name-interface cluster-beacon-interface fret-diagram-interface lyric-syllable-interface note-head-interface tab-note-head-interface lyric-interface percent-repeat-item-interface percent-repeat-interface stanza-number-interface)`.
- Set translator property `keyAlterationOrder` to `'((6 . -1/2) (2 . -1/2) (5 . -1/2) (1 . -1/2) (4 . -1/2) (0 . -1/2) (3 . -1/2) (3 . 1/2) (0 . 1/2) (4 . 1/2) (1 . 1/2) (5 . 1/2) (2 . 1/2) (6 . 1/2) (6 . -1) (2 . -1) (5 . -1) (1 . -1) (4 . -1) (0 . -1) (3 . -1) (3 . 1) (0 . 1) (4 . 1) (1 . 1) (5 . 1) (2 . 1) (6 . 1))`.
- Set translator property `lyricMelismaAlignment` to `-1`.
- Set translator property `majorSevenSymbol` to `'(#<procedure line-markup (layout props args)> ((#<procedure triangle-markup (layout props filled)> #f)))`.
- Set translator property `markFormatter` to `format-mark-letters`.
- Set translator property `measureLength` to `#<Mom 1>`.
- Set translator property `melismaBusyProperties` to `'(melismaBusy slurMelismaBusy tieMelismaBusy beamMelismaBusy completionBusy)`.
- Set translator property `metronomeMarkFormatter` to `format-metronome-markup`.
- Set translator property `middleCClefPosition` to `-6`.
- Set translator property `middleCPosition` to `-6`.
- Set translator property `noChordSymbol` to `'(#<procedure simple-markup (layout props str)> N.C.)`.
- Set translator property `noteToFretFunction` to `determine-frets`.
- Set translator property `pedalSostenutoStrings` to `'(Sost. Ped. *Sost. Ped. *)`.
- Set translator property `pedalSostenutoStyle` to `'mixed`.
- Set translator property `pedalSustainStrings` to `'(Ped. *Ped. *)`.
- Set translator property `pedalSustainStyle` to `'text`.
- Set translator property `pedalUnaCordaStrings` to `'(una corda tre corde)`.
- Set translator property `pedalUnaCordaStyle` to `'text`.
- Set translator property `predefinedDiagramTable` to `#f`.
- Set translator property `printKeyCancellation` to `#t`.
- Set translator property `printPartCombineTexts` to `#t`.
- Set translator property `quotedCueEventTypes` to `'(note-event rest-event tie-event beam-event tuplet-span-event)`.
- Set translator property `quotedEventTypes` to `'(StreamEvent)`.

- Set translator property `rehearsalMark` to `1`.
- Set translator property `repeatCountVisibility` to `all-repeat-counts-visible`.
- Set translator property `scriptDefinitions` to `'((accent (avoid-slur . around) (padding . 0.2) (script-stencil feta sforzato . sforzato) (side-relative-direction . -1)) (accentus (script-stencil feta uaccentus . uaccentus) (side-relative-direction . -1) (avoid-slur . ignore) (padding . 0.2) (quantize-position . #t) (script-priority . -100) (direction . 1)) (circulus (script-stencil feta circulus . circulus) (side-relative-direction . -1) (avoid-slur . ignore) (padding . 0.2) (quantize-position . #t) (script-priority . -100) (direction . 1)) (coda (script-stencil feta coda . coda) (padding . 0.2) (avoid-slur . outside) (direction . 1)) (comma (script-stencil feta lcomma . rcomma) (quantize-position . #t) (padding . 0.2) (avoid-slur . ignore) (direction . 1)) (downbow (script-stencil feta downbow . downbow) (padding . 0.2) (avoid-slur . around) (direction . 1) (script-priority . 150)) (downmordent (script-stencil feta downmordent . downmordent) (padding . 0.2) (avoid-slur . around) (direction . 1)) (downprall (script-stencil feta downprall . downprall) (padding . 0.2) (avoid-slur . around) (direction . 1)) (espressivo (avoid-slur . around) (padding . 0.2) (script-stencil feta espr . espr) (side-relative-direction . -1)) (fermata (script-stencil feta dfermata . ufermata) (padding . 0.2) (avoid-slur . around) (script-priority . 4000) (direction . 1)) (flageolet (script-stencil feta flageolet . flageolet) (padding . 0.2) (avoid-slur . around) (direction . 1)) (halfopen (avoid-slur . outside) (padding . 0.2) (script-stencil feta halfopen . halfopen) (direction . 1)) (ictus (script-stencil feta ictus . ictus) (side-relative-direction . -1) (quantize-position . #t) (avoid-slur . ignore) (padding . 0.2) (script-priority . -100) (direction . -1)) (lheel (script-stencil feta upedalheel . upedalheel) (padding . 0.2) (avoid-slur . around) (direction . -1)) (lineprall (script-stencil feta lineprall . lineprall) (padding . 0.2) (avoid-slur . around) (direction . 1)) (longfermata (script-stencil feta dlongfermata . ulongfermata) (padding . 0.2) (avoid-slur . around) (direction . 1)) (ltoe (script-stencil feta upedaltoe . upedaltoe) (padding . 0.2) (avoid-slur . around) (direction . -1)) (marcato (script-stencil feta dmarcato . umarcato) (padding . 0.2) (avoid-slur . inside) (quantize-position . #t) (side-relative-direction . -1)) (mordent (script-stencil feta mordent . mordent) (padding . 0.2) (avoid-slur . around) (direction . 1)) (open (avoid-slur . outside) (padding . 0.2) (script-stencil feta open . open) (direction . 1)) (portato (script-stencil feta uportato . dportato) (avoid-slur . around) (slur-padding . 0.3) (padding . 0.45) (side-relative-direction . -1)) (prall (script-stencil feta prall . prall) (padding . 0.2) (avoid-slur . around) (direction . 1)) (pralldown (script-stencil feta pralldown . pralldown) (padding . 0.2) (avoid-slur . around) (direction . 1)) (prallmordent (script-stencil feta prallmordent . prallmordent) (padding . 0.2) (avoid-slur . around) (direction . 1)) (prallprall (script-stencil feta prallprall . prallprall) (padding . 0.2) (avoid-slur . around) (direction . 1)) (prallup (script-stencil feta prallup . prallup) (padding . 0.2) (avoid-slur . around) (direction . 1)) (reverseturn (script-stencil feta reverseturn . reverseturn) (padding . 0.2) (avoid-slur . inside) (direction . 1)) (rheel (script-stencil feta dpedalheel . dpedalheel) (padding . 0.2) (avoid-slur . around) (direction . 1)) (rtoe (script-stencil feta dpedaltoe . dpedaltoe) (padding . 0.2) (avoid-slur . around) (direction . 1)) (segno (script-stencil feta segno . segno) (padding . 0.2) (avoid-slur . outside) (direction . 1)) (semicirculus (script-stencil feta dsemicirculus`

. dsemicirculus) (side-relative-direction . -1) (quantize-position . #t) (avoid-slur . ignore) (padding . 0.2) (script-priority . -100) (direction . 1)) (shortfermata (script-stencil feta dshortfermata . ushortfermata) (padding . 0.2) (avoid-slur . around) (direction . 1)) (signumcongruentiae (script-stencil feta dsignumcongruentiae . usignumcongruentiae) (padding . 0.2) (avoid-slur . outside) (direction . 1)) (snappizzicato (script-stencil feta snappizzicato . snappizzicato) (padding . 0.2) (avoid-slur . outside) (direction . 1)) (staccatissimo (avoid-slur . inside) (quantize-position . #t) (script-stencil feta dstaccatissimo . ustaccatissimo) (padding . 0.2) (side-relative-direction . -1)) (staccato (script-stencil feta staccato . staccato) (side-relative-direction . -1) (quantize-position . #t) (avoid-slur . inside) (toward-stem-shift . 0.5) (padding . 0.2) (script-priority . -100)) (stopped (script-stencil feta stopped . stopped) (avoid-slur . inside) (padding . 0.2) (direction . 1)) (tenuto (script-stencil feta tenuto . tenuto) (quantize-position . #t) (avoid-slur . inside) (padding . 0.2) (side-relative-direction . -1)) (thumb (script-stencil feta thumb . thumb) (avoid-slur . around) (padding . 0.5) (direction . 1) (slur-padding . 0.2) (staff-padding . 0.5)) (trill (script-stencil feta trill . trill) (direction . 1) (padding . 0.2) (avoid-slur . outside) (script-priority . 2000)) (turn (script-stencil feta turn . turn) (avoid-slur . inside) (padding . 0.2) (direction . 1)) (upbow (script-stencil feta upbow . upbow) (avoid-slur . around) (padding . 0.2) (direction . 1) (script-priority . 150)) (upmordent (script-stencil feta upmordent . upmordent) (padding . 0.2) (avoid-slur . around) (direction . 1)) (upprall (script-stencil feta upprall . upprall) (padding . 0.2) (avoid-slur . around) (direction . 1)) (varcoda (script-stencil feta varcoda . varcoda) (padding . 0.2) (avoid-slur . outside) (direction . 1)) (varcomma (script-stencil feta lvarcomma . rvarcomma) (quantize-position . #t) (padding . 0.2) (avoid-slur . ignore) (direction . 1)) (verylongfermata (script-stencil feta dverylongfermata . uverylongfermata) (padding . 0.2) (avoid-slur . around) (direction . 1))).

- Set translator property `soloIIText` to `"Solo II"`.
- Set translator property `soloText` to `"Solo"`.
- Set translator property `stringNumberOrientations` to `'(up down)`.
- Set translator property `stringOneTopmost` to `#t`.
- Set translator property `stringTunings` to `'(4 -1 -5 -10 -15 -20)`.
- Set translator property `strokeFingerOrientations` to `'(right)`.
- Set translator property `subdivideBeams` to `#f`.
- Set translator property `systemStartDelimiter` to `'SystemStartBar`.
- Set translator property `tablatureFormat` to `fret-number-tablature-format`.
- Set translator property `tabStaffLineLayoutFunction` to `tablature-position-on-lines`.
- Set translator property `tieWaitForNote` to `#f`.
- Set translator property `timeSignatureFraction` to `'(4 . 4)`.
- Set translator property `timeSignatureSettings` to `'(((2 . 2) (beamExceptions (end ((1 . 32) 8 8 8 8)))) ((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)))) ((6 . 8) (beamExceptions (end ((1 . 32) 4 4 4 4 4 4)))) ((9 . 4) (beamExceptions (end

```
((1 . 32) 8 8 8 8 8 8 8 8)))) ((9 . 8) (beamExceptions (end ((1 . 32) 4 4 4 4 4 4 4
4 4)))) ((12 . 4) (beamExceptions (end ((1 . 32) 8 8 8 8 8 8 8 8 8 8 8 8)))) ((12 .
8) (beamExceptions (end ((1 . 32) 4 4 4 4 4 4 4 4 4 4 4 4)))) ((5 . 8) (baseMoment
1 . 8) (beatStructure 3 2)) ((8 . 8) (baseMoment 1 . 8) (beatStructure 3 3 2))).
```

- Set translator property `timing` to `#t`.
- Set translator property `topLevelAlignment` to `#t`.

Context Score can contain Section 2.1.1 [ChoirStaff], page 52, Section 2.1.2 [ChordNames], page 53, Section 2.1.4 [Devnull], page 67, Section 2.1.5 [DrumStaff], page 67, Section 2.1.8 [FiguredBass], page 86, Section 2.1.9 [FretBoards], page 88, Section 2.1.11 [GrandStaff], page 90, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.14 [Lyrics], page 113, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.17 [NoteNames], page 137, Section 2.1.18 [PianoStaff], page 138, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155, Section 2.1.22 [StaffGroup], page 164, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

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

Section 2.2.8 [Bar_number_engraver], page 221

A bar number is created whenever `measurePosition` is zero and when there is a bar line (i.e., when `whichBar` is set). It is put on top of all staves, and appears only at the left side of the staff. The staves are taken from `stavesFound`, which is maintained by Section 2.2.102 [Staff_collecting_engraver], page 250.

Properties (read)

`barNumberVisibility` (procedure)
: A Procedure that takes an integer and returns whether the corresponding bar number should be printed.

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

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

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

```
\set Staff.whichBar = "|:"
```

  This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

This engraver creates the following layout object(s):

Section 3.1.12 [BarNumber], page 279.

Section 2.2.12 [Break_align_engraver], page 222

Align grobs with corresponding `break-align-symbols` into groups, and order the groups according to `breakAlignOrder`. The left edge of the alignment gets a separate group, with a symbol `left-edge`.

This engraver creates the following layout object(s):

Section 3.1.21 [BreakAlignGroup], page 285, Section 3.1.22 [BreakAlignment], page 286 and Section 3.1.54 [LeftEdge], page 314.

Section 2.2.22 [Default_bar_line_engraver], page 225
: This engraver determines what kind of automatic bar lines should be produced, and sets `whichBar` accordingly. It should be at the same level as Section 2.2.119 [Timing_translator], page 255.

  Properties (read)

  `automaticBars` (boolean)
  : If set to false then bar lines will not be printed automatically; they must be explicitly created with a `\bar` command. Unlike the `\cadenzaOn` keyword, measures are still counted. Bar line generation will resume according to that count if this property is unset.

  `barAlways` (boolean)
  : If set to true a bar line is drawn after each note.

  `defaultBarType` (string)
  : Set the default type of bar line. See `whichBar` for information on available bar types.

    This variable is read by Section "Timing_translator" in *Internals Reference* at Section "Score" in *Internals Reference* level.

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

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

  `whichBar` (string)
  : This property is read to determine what type of bar line to create.

    Example:

    ```
    \set Staff.whichBar = "|:"
    ```

    This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

  Properties (write)

  `automaticBars` (boolean)
  : If set to false then bar lines will not be printed automatically; they must be explicitly created with a `\bar` command. Unlike the `\cadenzaOn` keyword, measures are still counted. Bar line generation will resume according to that count if this property is unset.

Section 2.2.42 [Grace_spacing_engraver], page 232
: Bookkeeping of shortest starting and playing notes in grace note runs.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.41 [GraceSpacing], page 304.

`Section 2.2.59 [Mark_engraver], page 237`

Create `RehearsalMark` objects. It puts them on top of all staves (which is taken from the property `stavesFound`). If moving this engraver to a different context, Section 2.2.102 [Staff_collecting_engraver], page 250 must move along, otherwise all marks end up on the same Y location.

Music types accepted:

Section 1.2.32 [mark-event], page 41

Properties (read)

`markFormatter` (procedure)
: A procedure taking as arguments the context and the rehearsal mark. It should return the formatted mark as a markup object.

`rehearsalMark` (integer)
: The last rehearsal mark printed.

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

This engraver creates the following layout object(s):

Section 3.1.81 [RehearsalMark], page 335.

`Section 2.2.63 [Metronome_mark_engraver], page 238`

Engrave metronome marking. This delegates the formatting work to the function in the `metronomeMarkFormatter` property. The mark is put over all staves. The staves are taken from the `stavesFound` property, which is maintained by Section 2.2.102 [Staff_collecting_engraver], page 250.

Properties (read)

`metronomeMarkFormatter` (procedure)
: How to produce a metronome markup. Called with four arguments: text, duration, count and context.

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

`tempoHideNote` (boolean)
: Hide the note=count in tempo marks.

`tempoText` (markup)
: Text for tempo marks.

`tempoUnitCount` (number)
: Count for specifying tempo.

`tempoUnitDuration` (duration)
: Unit for specifying tempo.

This engraver creates the following layout object(s):

Section 3.1.63 [MetronomeMark], page 320.

Section 2.2.73 [Output_property_engraver], page 242
: Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

Section 2.2.75 [Paper_column_engraver], page 242
: Take care of generating columns.

This engraver decides whether a column is breakable. The default is that a column is always breakable. However, every `Bar_engraver` that does not have a barline at a certain point will set `forbidBreaks` in the score context to stop line breaks. In practice, this means that you can make a break point by creating a bar line (assuming that there are no beams or notes that prevent a break point).

Music types accepted:

Section 1.2.11 [break-event], page 39 and Section 1.2.26 [label-event], page 40

Properties (read)

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

Properties (write)

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

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

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

This engraver creates the following layout object(s):

Section 3.1.67 [NonMusicalPaperColumn], page 324 and Section 3.1.75 [PaperColumn], page 330.

Section 2.2.76 [Parenthesis_engraver], page 243
: Parenthesize objects whose music cause has the `parenthesize` property.

This engraver creates the following layout object(s):

Section 3.1.76 [ParenthesesItem], page 331.

Section 2.2.85 [Repeat_acknowledge_engraver], page 246
: Acknowledge repeated music, and convert the contents of `repeatCommands` into an appropriate setting for `whichBar`.

Properties (read)

`doubleRepeatType` (string)
: Set the default bar line for double repeats.

`repeatCommands` (list)
: This property is a list of commands of the form `(list 'volta x)`, where *x* is a string or `#f`. `'end-repeat` is also accepted as a command.

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

  ```
  \set Staff.whichBar = "|:"
  ```

  This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

Section 2.2.98 [Spacing_engraver], page 249

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

Music types accepted:

Section 1.2.56 [spacing-section-event], page 44

Properties (read)

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

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

`proportionalNotationDuration` (moment)
: Global override for shortest-playing duration. This is used for switching on proportional notation.

This engraver creates the following layout object(s):

Section 3.1.93 [SpacingSpanner], page 344.

Section 2.2.102 [Staff_collecting_engraver], page 250

Maintain the `stavesFound` variable.

Properties (read)

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

Properties (write)

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

Section 2.2.105 [Stanza_number_align_engraver], page 251

This engraver ensures that stanza numbers are neatly aligned.

Section 2.2.108 [System_start_delimiter_engraver], page 252
: Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

  Properties (read)

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

  `systemStartDelimiter` (symbol)
  : Which grob to make for the start of the system/staff? Set to `SystemStartBrace`, `SystemStartBracket` or `SystemStartBar`.

  `systemStartDelimiterHierarchy` (pair)
  : A nested list, indicating the nesting of a start delimiters.

  This engraver creates the following layout object(s):

  Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357 and Section 3.1.109 [SystemStartSquare], page 358.

Section 2.2.119 [Timing_translator], page 255
: This engraver adds the alias `Timing` to its containing context. Responsible for synchronizing timing information from staves. Normally in `Score`. In order to create polyrhythmic music, this engraver should be removed from `Score` and placed in `Staff`.

  Properties (read)

  `currentBarNumber` (integer)
  : Contains the current barnumber. This property is incremented at every bar line.

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

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

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

  Properties (write)

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

  `currentBarNumber` (integer)
  : Contains the current barnumber. This property is incremented at every bar line.

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

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

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

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

`Section 2.2.125 [Vertical_align_engraver], page 257`
: 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.

This engraver creates the following layout object(s):

Section 3.1.125 [VerticalAlignment], page 373.

`Section 2.2.126 [Volta_engraver], page 257`
: Make volta brackets.

Properties (read)

`repeatCommands` (list)
: This property is a list of commands of the form `(list 'volta x)`, where *x* is a string or `#f`. `'end-repeat` is also accepted as a command.

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

`voltaSpannerDuration` (moment)
: This specifies the maximum duration to use for the brackets printed for `\alternative`. This can be used to shrink the length of brackets in the situation where one alternative is very large.

This engraver creates the following layout object(s):

Section 3.1.128 [VoltaBracket], page 376 and Section 3.1.129 [VoltaBracketSpanner], page 376.

### 2.1.21 Staff

Handles clefs, bar lines, keys, accidentals. It can contain `Voice` contexts.

This context creates the following layout object(s):

Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.3 [AccidentalPlacement], page 271, Section 3.1.4 [AccidentalSuggestion], page 272, Section 3.1.11 [BarLine], page 277, Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.15 [BassFigureAlignmentPositioning], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282, Section 3.1.18 [BassFigureLine], page 283, Section 3.1.25 [Clef], page 288, Section 3.1.30 [DotColumn], page 292, Section 3.1.47 [InstrumentName], page 308, Section 3.1.49 [KeyCancellation], page 310, Section 3.1.50 [KeySignature], page 311, Section 3.1.53 [LedgerLineSpanner], page 313, Section 3.1.68 [NoteCollision], page 325, Section 3.1.73 [OctavateEight], page 328, Section 3.1.74 [OttavaBracket], page 329, Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.86 [RestCollision], page 339, Section 3.1.89 [ScriptRow], page 341, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.96 [StaffSpacing], page 347, Section 3.1.97 [StaffSymbol], page 347, Section 3.1.103 [SustainPedal], page 353, Section 3.1.104 [SustainPedalLineSpanner], page 354, Section 3.1.115 [TimeSignature], page 364, Section 3.1.122 [UnaCordaPedal], page 371, Section 3.1.123 [UnaCordaPedalLineSpanner], page 372 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set translator property `createSpacing` to `#t`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localKeySignature` to `'()`.
- Set translator property `shortInstrumentName` to `'()`.

Context Staff can contain Section 2.1.3 [CueVoice], page 54 and Section 2.1.27 [Voice], page 205.

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

Section 2.2.1 [Accidental_engraver], page 217

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)

`autoAccidentals` (list)

List of different ways to typeset an accidental.

For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used.

Each entry in the list is either a symbol or a procedure.

*symbol* The symbol is the name of the context in which the following rules are to be applied. For example, if *context* is Section "Score" in *Internals Reference* then all staves share accidentals, and if *context* is Section

"Staff" in *Internals Reference* then all voices in the same staff share accidentals, but staves do not.

*procedure* The procedure represents an accidental rule to be applied to the previously specified context.

The procedure takes the following arguments:

`context` The current context to which the rule should be applied.

`pitch` The pitch of the note to be evaluated.

`barnum` The current bar number.

`measurepos` The current measure position.

The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. `(#t . #f)` does not make sense.

`autoCautionaries` (list)
: List similar to `autoAccidentals`, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals changing from a non-natural to another non-natural.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

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

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`localKeySignature` (list)
: The key signature at this point in the measure. The format is the same as for `keySignature`, but can also contain `((octave . name) . (alter barnumber . measureposition))` pairs.

Properties (write)

`localKeySignature` (list)
: The key signature at this point in the measure. The format is the same as for `keySignature`, but can also contain `((octave . name) . (alter barnumber . measureposition))` pairs.

This engraver creates the following layout object(s):

Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.3 [AccidentalPlacement], page 271 and Section 3.1.4 [AccidentalSuggestion], page 272.

Section 2.2.5 [Axis_group_engraver], page 220
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.7 [Bar_engraver], page 220
: Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point.

Properties (read)

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

  ```
  \set Staff.whichBar = "|:"
  ```

  This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.11 [BarLine], page 277.

Section 2.2.16 [Clef_engraver], page 224
: Determine and set reference point for pitches.

Properties (read)

`clefGlyph` (string)
: Name of the symbol within the music font.

`clefOctavation` (integer)
: Add this much extra octavation. Values of 7 and -7 are common.

`clefPosition` (number)
: Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`forceClef` (boolean)
: Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):

Section 3.1.25 [Clef], page 288 and Section 3.1.73 [OctavateEight], page 328.

Section 2.2.18 [Collision_engraver], page 224
: Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s):

Section 3.1.68 [NoteCollision], page 325.

Section 2.2.23 [Dot_column_engraver], page 226
: Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s):

Section 3.1.30 [DotColumn], page 292.

Section 2.2.33 [Figured_bass_engraver], page 229
: Make figured bass numbers.

Music types accepted:

Section 1.2.6 [bass-figure-event], page 38 and Section 1.2.48 [rest-event], page 43

Properties (read)

`figuredBassAlterationDirection` (direction)
: Where to put alterations relative to the main figure.

`figuredBassCenterContinuations` (boolean)
: Whether to vertically center pairs of extender lines. This does not work with three or more lines.

`figuredBassFormatter` (procedure)
: A routine generating a markup for a bass figure.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):

Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282 and Section 3.1.18 [BassFigureLine], page 283.

Section 2.2.34 [Figured_bass_position_engraver], page 229
: Position figured bass alignments over notes.

This engraver creates the following layout object(s):

Section 3.1.15 [BassFigureAlignmentPositioning], page 281.

Section 2.2.36 [Font_size_engraver], page 230
: Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.45 [Grob_pq_engraver], page 233
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.49 [Instrument_name_engraver], page 234
: Create a system start text for instrument or vocal names.

Properties (read)

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

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

`shortInstrumentName` property labels following lines.

`shortInstrumentName` (markup)
: See `instrumentName`.

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

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308.

`Section 2.2.52 [Key_engraver], page 235`

Engrave a key signature.

Music types accepted:

Section 1.2.25 [key-change-event], page 40

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 changing from a non-natural to another non-natural.

`keyAlterationOrder` (list)
: An alist that defines in what order alterations should be printed. The format is `(`*`step . alter`*`)`, where *step* is a number from 0 to 6 and *alter* from -2 (sharp) to 2 (flat).

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`lastKeySignature` (list)
: Last key signature before a key signature change.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`lastKeySignature` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
: The tonic of the current scale.

This engraver creates the following layout object(s):

Section 3.1.49 [KeyCancellation], page 310 and Section 3.1.50 [KeySignature], page 311.

`Section 2.2.55 [Ledger_line_engraver], page 236`
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):

Section 3.1.53 [LedgerLineSpanner], page 313.

`Section 2.2.72 [Ottava_spanner_engraver], page 241`
Create a text spanner when the ottavation property changes.

Properties (read)

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

`middleCOffset` (number)
: The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):

Section 3.1.74 [OttavaBracket], page 329.

`Section 2.2.73 [Output_property_engraver], page 242`
Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

`Section 2.2.80 [Piano_pedal_align_engraver], page 244`
Align piano pedal symbols and brackets.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.104 [SustainPedalLineSpanner], page 354 and Section 3.1.123 [UnaCordaPedalLineSpanner], page 372.

`Section 2.2.81 [Piano_pedal_engraver], page 245`

Engrave piano pedal symbols and brackets.

Music types accepted:

Section 1.2.55 [sostenuto-event], page 44, Section 1.2.63 [sustain-event], page 46 and Section 1.2.71 [una-corda-event], page 46

Properties (read)

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

`pedalSostenutoStrings` (list)
: See `pedalSustainStrings`.

`pedalSostenutoStyle` (symbol)
: See `pedalSustainStyle`.

`pedalSustainStrings` (list)
: A list of strings to print for sustain-pedal. Format is `(up updown down)`, where each of the three is the string to print when this is done with the pedal.

`pedalSustainStyle` (symbol)
: A symbol that indicates how to print sustain pedals: `text`, `bracket` or `mixed` (both).

`pedalUnaCordaStrings` (list)
: See `pedalSustainStrings`.

`pedalUnaCordaStyle` (symbol)
: See `pedalSustainStyle`.

This engraver creates the following layout object(s):

Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.103 [SustainPedal], page 353 and Section 3.1.122 [UnaCordaPedal], page 371.

`Section 2.2.87 [Rest_collision_engraver], page 246`

Handle collisions of rests.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.86 [RestCollision], page 339.

Section 2.2.93 [Script_row_engraver], page 248

Determine order in horizontal side position elements.

This engraver creates the following layout object(s):

Section 3.1.89 [ScriptRow], page 341.

Section 2.2.94 [Separating_line_group_engraver], page 248

Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.96 [StaffSpacing], page 347.

Section 2.2.102 [Staff_collecting_engraver], page 250

Maintain the `stavesFound` variable.

Properties (read)

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

Properties (write)

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

Section 2.2.104 [Staff_symbol_engraver], page 251

Create the constellation of five (default) staff lines.

Music types accepted:

Section 1.2.59 [staff-span-event], page 45

This engraver creates the following layout object(s):

Section 3.1.97 [StaffSymbol], page 347.

Section 2.2.117 [Time_signature_engraver], page 255

Create a Section 3.1.115 [TimeSignature], page 364 whenever `timeSignatureFraction` changes.

Properties (read)

`implicitTimeSignatureVisibility` (vector)
: break visibility for the default time signature.

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

This engraver creates the following layout object(s):

Section 3.1.115 [TimeSignature], page 364.

### 2.1.22 StaffGroup

Groups staves while adding a bracket on the left side, grouping the staves together. The bar lines of the contained staves are connected vertically. `StaffGroup` only consists of a collection of staves, with a bracket in front and spanning bar lines.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276, Section 3.1.94 [SpanBar], page 345, Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357, Section 3.1.109 [SystemStartSquare], page 358 and Section 3.1.125 [VerticalAlignment], page 373.

This context sets the following properties:

- Set translator property `systemStartDelimiter` to `'SystemStartBracket`.
- Set translator property `topLevelAlignment` to `#f`.

Context StaffGroup can contain Section 2.1.1 [ChoirStaff], page 52, Section 2.1.2 [ChordNames], page 53, Section 2.1.5 [DrumStaff], page 67, Section 2.1.8 [FiguredBass], page 86, Section 2.1.11 [GrandStaff], page 90, Section 2.1.14 [Lyrics], page 113, Section 2.1.18 [PianoStaff], page 138, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155, Section 2.1.22 [StaffGroup], page 164 and Section 2.1.23 [TabStaff], page 165.

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

Section 2.2.73 [Output_property_engraver], page 242
: Apply a procedure to any grob acknowledged.

  Music types accepted:

  Section 1.2.3 [apply-output-event], page 38

Section 2.2.99 [Span_arpeggio_engraver], page 250
: Make arpeggios that span multiple staves.

  Properties (read)

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

  This engraver creates the following layout object(s):

  Section 3.1.9 [Arpeggio], page 276.

Section 2.2.100 [Span_bar_engraver], page 250
: Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.

  This engraver creates the following layout object(s):

  Section 3.1.94 [SpanBar], page 345.

Section 2.2.108 [System_start_delimiter_engraver], page 252
: Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

  Properties (read)

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

`systemStartDelimiter` (symbol)
: Which grob to make for the start of the system/staff? Set to `SystemStartBrace`, `SystemStartBracket` or `SystemStartBar`.

`systemStartDelimiterHierarchy` (pair)
: A nested list, indicating the nesting of a start delimiters.

This engraver creates the following layout object(s):

Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357 and Section 3.1.109 [SystemStartSquare], page 358.

`Section 2.2.125 [Vertical_align_engraver], page 257`
: 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.

This engraver creates the following layout object(s):

Section 3.1.125 [VerticalAlignment], page 373.

### 2.1.23 TabStaff

Context for generating tablature. It accepts only `TabVoice` contexts and handles the line spacing, the tablature clef etc. properly.

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

Staff.

This context creates the following layout object(s):

Section 3.1.11 [BarLine], page 277, Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.15 [BassFigureAlignmentPositioning], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282, Section 3.1.18 [BassFigureLine], page 283, Section 3.1.25 [Clef], page 288, Section 3.1.30 [DotColumn], page 292, Section 3.1.47 [InstrumentName], page 308, Section 3.1.53 [LedgerLineSpanner], page 313, Section 3.1.68 [NoteCollision], page 325, Section 3.1.73 [OctavateEight], page 328, Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.86 [RestCollision], page 339, Section 3.1.89 [ScriptRow], page 341, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.96 [StaffSpacing], page 347, Section 3.1.97 [StaffSymbol], page 347, Section 3.1.103 [SustainPedal], page 353, Section 3.1.104 [SustainPedalLineSpanner], page 354, Section 3.1.115 [TimeSignature], page 364, Section 3.1.122 [UnaCordaPedal], page 371, Section 3.1.123 [UnaCordaPedalLineSpanner], page 372 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set grob-property `avoid-note-head` in Section 3.1.99 [Stem], page 348 to `#t`.
- Set grob-property `ignore-collision` in Section 3.1.69 [NoteColumn], page 326 to `#t`.
- Set grob-property `staff-space` in Section 3.1.97 [StaffSymbol], page 347 to `1.5`.

- Set grob-property `stencils` in Section 3.1.76 [ParenthesesItem], page 331 to `parentheses-item::calc-tabstaff-parenthesis-stencils`.
- Set grob-property `stencil` in Section 3.1.9 [Arpeggio], page 276 to `#f`.
- Set grob-property `stencil` in Section 3.1.25 [Clef], page 288 to `clef::print-modern-tab-if-set`.
- Set grob-property `stencil` in Section 3.1.115 [TimeSignature], page 364 to `#f`.
- Set translator property `clefGlyph` to `"clefs.tab"`.
- Set translator property `clefPosition` to `0`.
- Set translator property `createSpacing` to `#t`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localKeySignature` to `'()`.
- Set translator property `shortInstrumentName` to `'()`.

Context TabStaff can contain Section 2.1.3 [CueVoice], page 54 and Section 2.1.24 [TabVoice], page 171.

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

Section 2.2.5 [Axis_group_engraver], page 220
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

  Properties (read)

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

  This engraver creates the following layout object(s):

  Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.7 [Bar_engraver], page 220
: Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point.

  Properties (read)

  `whichBar` (string)
  : This property is read to determine what type of bar line to create.

    Example:

    ```
    \set Staff.whichBar = "|:"
    ```

    This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

  Properties (write)

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

  This engraver creates the following layout object(s):

  Section 3.1.11 [BarLine], page 277.

Section 2.2.16 [Clef_engraver], page 224
Determine and set reference point for pitches.

Properties (read)

`clefGlyph` (string)
Name of the symbol within the music font.

`clefOctavation` (integer)
Add this much extra octavation. Values of 7 and -7 are common.

`clefPosition` (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`explicitClefVisibility` (vector)
'`break-visibility`' function for clef changes.

`forceClef` (boolean)
Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):

Section 3.1.25 [Clef], page 288 and Section 3.1.73 [OctavateEight], page 328.

Section 2.2.18 [Collision_engraver], page 224
Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s):

Section 3.1.68 [NoteCollision], page 325.

Section 2.2.23 [Dot_column_engraver], page 226
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s):

Section 3.1.30 [DotColumn], page 292.

Section 2.2.33 [Figured_bass_engraver], page 229
Make figured bass numbers.

Music types accepted:

Section 1.2.6 [bass-figure-event], page 38 and Section 1.2.48 [rest-event], page 43

Properties (read)

`figuredBassAlterationDirection` (direction)
Where to put alterations relative to the main figure.

`figuredBassCenterContinuations` (boolean)
Whether to vertically center pairs of extender lines. This does not work with three or more lines.

`figuredBassFormatter` (procedure)
: A routine generating a markup for a bass figure.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):

Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282 and Section 3.1.18 [BassFigureLine], page 283.

Section 2.2.34 [Figured_bass_position_engraver], page 229
: Position figured bass alignments over notes.

This engraver creates the following layout object(s):

Section 3.1.15 [BassFigureAlignmentPositioning], page 281.

Section 2.2.36 [Font_size_engraver], page 230
: Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.45 [Grob_pq_engraver], page 233
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.49 [Instrument_name_engraver], page 234
: Create a system start text for instrument or vocal names.

Properties (read)

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

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

`shortInstrumentName` (markup)
: See `instrumentName`.

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

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308.

`Section 2.2.55 [Ledger_line_engraver], page 236`
: Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):

Section 3.1.53 [LedgerLineSpanner], page 313.

`Section 2.2.73 [Output_property_engraver], page 242`
: Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

`Section 2.2.80 [Piano_pedal_align_engraver], page 244`
: Align piano pedal symbols and brackets.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.104 [SustainPedalLineSpanner], page 354 and Section 3.1.123 [UnaCordaPedalLineSpanner], page 372.

`Section 2.2.81 [Piano_pedal_engraver], page 245`
: Engrave piano pedal symbols and brackets.

Music types accepted:

Section 1.2.55 [sostenuto-event], page 44, Section 1.2.63 [sustain-event], page 46 and Section 1.2.71 [una-corda-event], page 46

Properties (read)

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

`pedalSostenutoStrings` (list)
See `pedalSustainStrings`.

`pedalSostenutoStyle` (symbol)
See `pedalSustainStyle`.

`pedalSustainStrings` (list)
A list of strings to print for sustain-pedal. Format is `(up updown down)`, where each of the three is the string to print when this is done with the pedal.

`pedalSustainStyle` (symbol)
A symbol that indicates how to print sustain pedals: `text`, `bracket` or `mixed` (both).

`pedalUnaCordaStrings` (list)
See `pedalSustainStrings`.

`pedalUnaCordaStyle` (symbol)
See `pedalSustainStyle`.

This engraver creates the following layout object(s):

Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.103 [SustainPedal], page 353 and Section 3.1.122 [UnaCordaPedal], page 371.

Section 2.2.87 [Rest_collision_engraver], page 246
Handle collisions of rests.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.86 [RestCollision], page 339.

Section 2.2.93 [Script_row_engraver], page 248
Determine order in horizontal side position elements.

This engraver creates the following layout object(s):

Section 3.1.89 [ScriptRow], page 341.

Section 2.2.94 [Separating_line_group_engraver], page 248
Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.96 [StaffSpacing], page 347.

Section 2.2.102 [Staff_collecting_engraver], page 250
Maintain the `stavesFound` variable.

Properties (read)

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

Properties (write)

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

Section 2.2.104 [Staff_symbol_engraver], page 251
Create the constellation of five (default) staff lines.

Music types accepted:

Section 1.2.59 [staff-span-event], page 45

This engraver creates the following layout object(s):

Section 3.1.97 [StaffSymbol], page 347.

Section 2.2.111 [Tab_staff_symbol_engraver], page 253
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 pitch (in semitones) of each string (starting with the lower one).

This engraver creates the following layout object(s):

Section 3.1.97 [StaffSymbol], page 347.

Section 2.2.117 [Time_signature_engraver], page 255
Create a Section 3.1.115 [TimeSignature], page 364 whenever `timeSignatureFraction` changes.

Properties (read)

`implicitTimeSignatureVisibility` (vector)
break visibility for the default time signature.

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

This engraver creates the following layout object(s):

Section 3.1.115 [TimeSignature], page 364.

### 2.1.24 TabVoice

Context for drawing notes in a Tab staff.

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

Voice.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276, Section 3.1.19 [Beam], page 283, Section 3.1.20 [BendAfter], page 285, Section 3.1.23 [BreathingSign], page 287, Section 3.1.26 [ClusterSpanner], page 289, Section 3.1.27 [ClusterSpannerBeacon], page 290, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.31 [Dots], page 293, Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.40 [Glissando], page 303, Section 3.1.44 [Hairpin], page 305, Section 3.1.45 [HarmonicParenthesesItem], page 307, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.51 [LaissezVibrerTie], page 312, Section 3.1.52 [LaissezVibrerTieColumn], page 313, Section 3.1.55 [LigatureBracket], page 314, Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.69 [NoteColumn], page 326, Section 3.1.72 [NoteSpacing], page 327, Section 3.1.77 [PercentRepeat], page 331, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.79 [PhrasingSlur], page 333, Section 3.1.82 [RepeatSlash], page 337, Section 3.1.83 [RepeatTie], page 337, Section 3.1.84 [RepeatTieColumn], page 338, Section 3.1.85 [Rest], page 339, Section 3.1.87 [Script], page 339, Section 3.1.88 [ScriptColumn], page 340, Section 3.1.90 [Slur], page 341, Section 3.1.99 [Stem], page 348, Section 3.1.100 [StemTremolo], page 350, Section 3.1.110 [TabNoteHead], page 358, Section 3.1.111 [TextScript], page 360, Section 3.1.112 [TextSpanner], page 361, Section 3.1.113 [Tie], page 362, Section 3.1.114 [TieColumn], page 364, Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.118 [TrillPitchHead], page 367, Section 3.1.119 [TrillSpanner], page 368, Section 3.1.120 [TupletBracket], page 369, Section 3.1.121 [TupletNumber], page 370 and Section 3.1.127 [VoiceFollower], page 375.

This context sets the following properties:

- Set grob-property `after-line-breaking` in Section 3.1.83 [RepeatTie], page 337 to `repeat-tie::handle-tab-note-head`.
- Set grob-property `after-line-breaking` in Section 3.1.113 [Tie], page 362 to `tie::handle-tab-note-head`.
- Set grob-property `beam-thickness` in Section 3.1.19 [Beam], page 283 to `0.32`.
- Set grob-property `beam-thickness` in Section 3.1.100 [StemTremolo], page 350 to `0.32`.
- Set grob-property `beam-width` in Section 3.1.100 [StemTremolo], page 350 to `stem-tremolo::calc-tab-width`.
- Set grob-property `bound-details left` in Section 3.1.40 [Glissando], page 303 to `'((attach-dir . 1) (padding . 0.3))`.
- Set grob-property `bound-details right` in Section 3.1.40 [Glissando], page 303 to `'((attach-dir . -1) (padding . 0.3))`.
- Set grob-property `details` in Section 3.1.99 [Stem], page 348 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 Section 3.1.40 [Glissando], page 303 to `glissando::calc-tab-extra-dy`.
- Set grob-property `flag-style` in Section 3.1.99 [Stem], page 348 to `'no-flag`.
- Set grob-property `glyph-name` in Section 3.1.110 [TabNoteHead], page 358 to `tab-note-head::calc-glyph-name`.
- Set grob-property `length-fraction` in Section 3.1.19 [Beam], page 283 to `0.62`.
- Set grob-property `length-fraction` in Section 3.1.100 [StemTremolo], page 350 to `#<procedure #f (grob)>`.
- Set grob-property `length` in Section 3.1.99 [Stem], page 348 to `0`.

- Set grob-property `no-stem-extend` in Section 3.1.99 [Stem], page 348 to `#t`.
- Set grob-property `stencil` in Section 3.1.19 [Beam], page 283 to `#f`.
- Set grob-property `stencil` in Section 3.1.31 [Dots], page 293 to `#f`.
- Set grob-property `stencil` in Section 3.1.36 [DynamicTextSpanner], page 298 to `#f`.
- Set grob-property `stencil` in Section 3.1.51 [LaissezVibrerTie], page 312 to `#f`.
- Set grob-property `stencil` in Section 3.1.64 [MultiMeasureRest], page 321 to `#f`.
- Set grob-property `stencil` in Section 3.1.79 [PhrasingSlur], page 333 to `#f`.
- Set grob-property `stencil` in Section 3.1.83 [RepeatTie], page 337 to `#f`.
- Set grob-property `stencil` in Section 3.1.85 [Rest], page 339 to `#f`.
- Set grob-property `stencil` in Section 3.1.87 [Script], page 339 to `#f`.
- Set grob-property `stencil` in Section 3.1.90 [Slur], page 341 to `slur::draw-tab-slur`.
- Set grob-property `stencil` in Section 3.1.100 [StemTremolo], page 350 to `#f`.
- Set grob-property `stencil` in Section 3.1.110 [TabNoteHead], page 358 to `tab-note-head::whiteout-if-style-set`.
- Set grob-property `stencil` in Section 3.1.111 [TextScript], page 360 to `#f`.
- Set grob-property `stencil` in Section 3.1.112 [TextSpanner], page 361 to `#f`.
- Set grob-property `stencil` in Section 3.1.113 [Tie], page 362 to `#f`.
- Set grob-property `stencil` in Section 3.1.120 [TupletBracket], page 369 to `#f`.
- Set grob-property `stencil` in Section 3.1.121 [TupletNumber], page 370 to `#f`.
- Set grob-property `transparent` in Section 3.1.35 [DynamicText], page 297 to `#t`.
- Set grob-property `transparent` in Section 3.1.44 [Hairpin], page 305 to `#t`.
- Set grob-property `transparent` in Section 3.1.65 [MultiMeasureRestNumber], page 322 to `#t`.
- Set grob-property `transparent` in Section 3.1.66 [MultiMeasureRestText], page 323 to `#t`.
- Set grob-property `transparent` in Section 3.1.99 [Stem], page 348 to `#t`.
- Set translator property `autoBeaming` to `#f`.
- Set translator property `localKeySignature` to `'()`.

This context is a 'bottom' context; it cannot contain other contexts.

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

`Section 2.2.3 [Arpeggio_engraver], page 219`

Generate an Arpeggio symbol.

Music types accepted:

Section 1.2.4 [arpeggio-event], page 38

This engraver creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276.

`Section 2.2.4 [Auto_beam_engraver], page 219`

Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.107 [Stem_engraver], page 251 properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted:

Section 1.2.8 [beam-forbid-event], page 39

Properties (read)

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

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.9 [Beam_engraver], page 221
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.11 [Bend_engraver], page 222
Create fall spanners.

Music types accepted:

Section 1.2.9 [bend-after-event], page 39

This engraver creates the following layout object(s):

Section 3.1.20 [BendAfter], page 285.

`Section 2.2.13 [Breathing_sign_engraver], page 223`
Create a breathing sign.

Music types accepted:

Section 1.2.13 [breathing-event], page 39

This engraver creates the following layout object(s):

Section 3.1.23 [BreathingSign], page 287.

`Section 2.2.15 [Chord_tremolo_engraver], page 223`
Generate beams for tremolo repeats.

Music types accepted:

Section 1.2.68 [tremolo-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.17 [Cluster_spanner_engraver], page 224`
Engrave a cluster using `Spanner` notation.

Music types accepted:

Section 1.2.14 [cluster-note-event], page 39

This engraver creates the following layout object(s):

Section 3.1.26 [ClusterSpanner], page 289 and Section 3.1.27 [ClusterSpannerBeacon], page 290.

`Section 2.2.24 [Dots_engraver], page 226`
Create Section 3.1.31 [Dots], page 293 objects for Section 3.2.82 [rhythmic-head-interface], page 419s.

This engraver creates the following layout object(s):

Section 3.1.31 [Dots], page 293.

`Section 2.2.27 [Dynamic_align_engraver], page 227`
Align hairpins and dynamic texts on a horizontal line.

Music types accepted:

Section 1.2.12 [break-span-event], page 39

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.34 [DynamicLineSpanner], page 296.

`Section 2.2.36 [Font_size_engraver], page 230`
Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.37 [Forbid_line_break_engraver], page 230
Forbid line breaks when note heads are still playing at some point.

Properties (read)

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

Properties (write)

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

Section 2.2.39 [Glissando_engraver], page 231
Engrave glissandi.

Music types accepted:

Section 1.2.22 [glissando-event], page 40

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303.

Section 2.2.40 [Grace_beam_engraver], page 231
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.41 [Grace_engraver], page 232
Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

Section 2.2.45 [Grob_pq_engraver], page 233
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.50 [Instrument_switch_engraver], page 234
Create a cue text for taking instrument.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.48 [InstrumentSwitch], page 309.

Section 2.2.54 [Laissez_vibrer_engraver], page 236
Create laissez vibrer items.

Music types accepted:

Section 1.2.27 [laissez-vibrer-event], page 40

This engraver creates the following layout object(s):

Section 3.1.51 [LaissezVibrerTie], page 312 and Section 3.1.52 [LaissezVibrerTieColumn], page 313.

Section 2.2.56 [Ligature_bracket_engraver], page 236
Handle `Ligature_events` by engraving `Ligature` brackets.

Music types accepted:

Section 1.2.29 [ligature-event], page 41

This engraver creates the following layout object(s):

Section 3.1.55 [LigatureBracket], page 314.

Section 2.2.64 [Multi_measure_rest_engraver], page 238
Engrave multi-measure rests that are produced with 'R'. It reads `measurePosition` and `internalBarNumber` to determine what number to print over the Section 3.1.64 [MultiMeasureRest], page 321. Reads `measureLength` to determine whether it should use a whole rest or a breve rest to represent one measure.

Music types accepted:

Section 1.2.34 [multi-measure-rest-event], page 41 and Section 1.2.35 [multi-measure-text-event], page 41

Properties (read)

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

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322 and Section 3.1.66 [MultiMeasureRestText], page 323.

`Section 2.2.65 [New_dynamic_engraver], page 239`
: Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:

Section 1.2.1 [absolute-dynamic-event], page 38 and Section 1.2.57 [span-dynamic-event], page 44

Properties (read)

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

`crescendoText` (markup)
: The text to print at start of non-hairpin crescendo, i.e., '`cresc.`'.

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

`decrescendoSpanner` (symbol)
: The type of spanner to be used for decrescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin decrescendo is used.

`decrescendoText` (markup)
: The text to print at start of non-hairpin decrescendo, i.e., '`dim.`'.

This engraver creates the following layout object(s):

Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298 and Section 3.1.44 [Hairpin], page 305.

Section 2.2.67 [Note_head_line_engraver], page 240

Engrave a line between two note heads, for example a glissando. If `followVoice` is set, staff switches also generate a line.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303 and Section 3.1.127 [VoiceFollower], page 375.

Section 2.2.71 [Note_spacing_engraver], page 241

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

This engraver creates the following layout object(s):

Section 3.1.72 [NoteSpacing], page 327.

Section 2.2.73 [Output_property_engraver], page 242

Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

Section 2.2.77 [Part_combine_engraver], page 243

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

Music types accepted:

Section 1.2.41 [part-combine-event], page 42

Properties (read)

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.28 [CombineTextScript], page 290.

Section 2.2.78 [Percent_repeat_engraver], page 243

Make whole bar and double bar repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.77 [PercentRepeat], page 331 and Section 3.1.78 [PercentRepeatCounter], page 332.

`Section 2.2.79 [Phrasing_slur_engraver], page 244`
Print phrasing slurs. Similar to Section 2.2.96 [Slur_engraver], page 249.

Music types accepted:

Section 1.2.46 [phrasing-slur-event], page 43

This engraver creates the following layout object(s):

Section 3.1.79 [PhrasingSlur], page 333.

`Section 2.2.84 [Pitched_trill_engraver], page 246`
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s):

Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366 and Section 3.1.118 [TrillPitchHead], page 367.

`Section 2.2.86 [Repeat_tie_engraver], page 246`
Create repeat ties.

Music types accepted:

Section 1.2.47 [repeat-tie-event], page 43

This engraver creates the following layout object(s):

Section 3.1.83 [RepeatTie], page 337 and Section 3.1.84 [RepeatTieColumn], page 338.

`Section 2.2.88 [Rest_engraver], page 247`
Engrave rests.

Music types accepted:

Section 1.2.48 [rest-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.85 [Rest], page 339.

Section 2.2.89 [Rhythmic_column_engraver], page 247
: Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s):

Section 3.1.69 [NoteColumn], page 326.

Section 2.2.91 [Script_column_engraver], page 247
: Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s):

Section 3.1.88 [ScriptColumn], page 340.

Section 2.2.92 [Script_engraver], page 248
: Handle note scripted articulations.

Music types accepted:

Section 1.2.5 [articulation-event], page 38

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.87 [Script], page 339.

Section 2.2.95 [Slash_repeat_engraver], page 249
: Make beat repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.82 [RepeatSlash], page 337.

Section 2.2.96 [Slur_engraver], page 249
: Build slur grobs from slur events.

Music types accepted:

Section 1.2.52 [slur-event], page 44

Properties (read)

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

`slurMelismaBusy` (boolean)
: Signal if a slur is present.

This engraver creates the following layout object(s):

Section 3.1.90 [Slur], page 341.

Section 2.2.101 [Spanner_break_forbid_engraver], page 250
: Forbid breaks in certain spanners.

Section 2.2.107 [Stem_engraver], page 251
: Create stems and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:

Section 1.2.67 [tremolo-event], page 46

Properties (read)

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

`stemRightBeamCount` (integer)
: See `stemLeftBeamCount`.

`tremoloFlags` (integer)
: The number of tremolo flags to add if no number is specified.

This engraver creates the following layout object(s):

Section 3.1.99 [Stem], page 348 and Section 3.1.100 [StemTremolo], page 350.

Section 2.2.109 [Tab_harmonic_engraver], page 252
: In a tablature, parenthesize objects whose music cause has the `parenthesize` property.

This engraver creates the following layout object(s):

Section 3.1.45 [HarmonicParenthesesItem], page 307.

Section 2.2.110 [Tab_note_heads_engraver], page 252
: Generate one or more tablature note heads from event of type `NoteEvent`.

Music types accepted:

Section 1.2.37 [note-event], page 42 and Section 1.2.61 [string-number-event], page 45

Properties (read)

`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.

`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 pitch (in semitones) of each string (starting with the lower one).

`tablatureFormat` (procedure)
: A function formatting a tablature note head. Called with three arguments: context, string number and, fret number. It returns the text as a markup.

`tabStaffLineLayoutFunction` (procedure)
: A function determining the staff position of a tablature note head. Called with two arguments: the context and the string.

This engraver creates the following layout object(s):

Section 3.1.110 [TabNoteHead], page 358.

`Section 2.2.113 [Text_engraver], page 254`

Create text scripts.

Music types accepted:

Section 1.2.64 [text-script-event], page 46

This engraver creates the following layout object(s):

Section 3.1.111 [TextScript], page 360.

`Section 2.2.114 [Text_spanner_engraver], page 254`

Create text spanner from an event.

Music types accepted:

Section 1.2.65 [text-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.112 [TextSpanner], page 361.

Section 2.2.115 [Tie_engraver], page 254

Generate ties between note heads of equal pitch.

Music types accepted:

Section 1.2.66 [tie-event], page 46

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.

This engraver creates the following layout object(s):

Section 3.1.113 [Tie], page 362 and Section 3.1.114 [TieColumn], page 364.

Section 2.2.121 [Trill_spanner_engraver], page 256

Create trill spanner from an event.

Music types accepted:

Section 1.2.69 [trill-span-event], page 46

Properties (read)

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

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

This engraver creates the following layout object(s):

Section 3.1.119 [TrillSpanner], page 368.

Section 2.2.122 [Tuplet_engraver], page 256

Catch tuplet events and generate appropriate bracket.

Music types accepted:

Section 1.2.70 [tuplet-span-event], page 46

Properties (read)

`tupletFullLength` (boolean)
: If set, the tuplet is printed up to the start of the next note.

`tupletFullLengthNote` (boolean)
: If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

This engraver creates the following layout object(s):

Section 3.1.120 [TupletBracket], page 369 and Section 3.1.121 [TupletNumber], page 370.

`Section 2.2.123 [Tweak_engraver], page 257`
Read the `tweaks` property from the originating event, and set properties.

### 2.1.25 VaticanaStaff

Same as `Staff` context, except that it is accommodated for typesetting Gregorian Chant in the notational style of Editio Vaticana.

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

Staff.

This context creates the following layout object(s):

Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.3 [AccidentalPlacement], page 271, Section 3.1.4 [AccidentalSuggestion], page 272, Section 3.1.11 [BarLine], page 277, Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.15 [BassFigureAlignmentPositioning], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282, Section 3.1.18 [BassFigureLine], page 283, Section 3.1.25 [Clef], page 288, Section 3.1.29 [Custos], page 292, Section 3.1.30 [DotColumn], page 292, Section 3.1.47 [InstrumentName], page 308, Section 3.1.49 [KeyCancellation], page 310, Section 3.1.50 [KeySignature], page 311, Section 3.1.53 [LedgerLineSpanner], page 313, Section 3.1.68 [NoteCollision], page 325, Section 3.1.73 [OctavateEight], page 328, Section 3.1.74 [OttavaBracket], page 329, Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.86 [RestCollision], page 339, Section 3.1.89 [ScriptRow], page 341, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.96 [StaffSpacing], page 347, Section 3.1.97 [StaffSymbol], page 347, Section 3.1.103 [SustainPedal], page 353, Section 3.1.104 [SustainPedalLineSpanner], page 354, Section 3.1.122 [UnaCordaPedal], page 371, Section 3.1.123 [UnaCordaPedalLineSpanner], page 372 and Section 3.1.126 [VerticalAxisGroup], page 373.

This context sets the following properties:

- Set grob-property `glyph-name-alist` in Section 3.1.1 [Accidental], page 270 to `'((-1/2 . accidentals.vaticanaM1) (0 . accidentals.vaticana0) (1/2 . accidentals.mensural1))`.
- Set grob-property `glyph-name-alist` in Section 3.1.50 [KeySignature], page 311 to `'((-1/2 . accidentals.vaticanaM1) (0 . accidentals.vaticana0) (1/2 . accidentals.mensural1))`.
- Set grob-property `line-count` in Section 3.1.97 [StaffSymbol], page 347 to `4`.
- Set grob-property `neutral-direction` in Section 3.1.29 [Custos], page 292 to `-1`.
- Set grob-property `neutral-position` in Section 3.1.29 [Custos], page 292 to `3`.
- Set grob-property `style` in Section 3.1.29 [Custos], page 292 to `'vaticana`.
- Set grob-property `style` in Section 3.1.31 [Dots], page 293 to `'vaticana`.
- Set grob-property `thickness` in Section 3.1.97 [StaffSymbol], page 347 to `0.6`.
- Set grob-property `transparent` in Section 3.1.11 [BarLine], page 277 to `#t`.
- Set translator property `clefGlyph` to `"clefs.vaticana.do"`.
- Set translator property `clefOctavation` to `0`.
- Set translator property `clefPosition` to `1`.
- Set translator property `createSpacing` to `#t`.

- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localKeySignature` to `'()`.
- Set translator property `middleCClefPosition` to `1`.
- Set translator property `middleCPosition` to `1`.
- Set translator property `shortInstrumentName` to `'()`.

Context VaticanaStaff can contain Section 2.1.3 [CueVoice], page 54 and Section 2.1.26 [VaticanaVoice], page 194.

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

Section 2.2.1 [Accidental_engraver], page 217
: 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)

  `autoAccidentals` (list)
  : List of different ways to typeset an accidental.

    For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used.

    Each entry in the list is either a symbol or a procedure.

    *symbol* The symbol is the name of the context in which the following rules are to be applied. For example, if *context* is Section "Score" in *Internals Reference* then all staves share accidentals, and if *context* is Section "Staff" in *Internals Reference* then all voices in the same staff share accidentals, but staves do not.

    *procedure* The procedure represents an accidental rule to be applied to the previously specified context.

    The procedure takes the following arguments:

    `context` The current context to which the rule should be applied.

    `pitch` The pitch of the note to be evaluated.

    `barnum` The current bar number.

    `measurepos` The current measure position.

The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. `(#t . #f)` does not make sense.

`autoCautionaries` (list)
: List similar to `autoAccidentals`, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals changing from a non-natural to another non-natural.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

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

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`localKeySignature` (list)
: The key signature at this point in the measure. The format is the same as for `keySignature`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber`*` . `*`measureposition`*`))` pairs.

Properties (write)

`localKeySignature` (list)
: The key signature at this point in the measure. The format is the same as for `keySignature`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber`*` . `*`measureposition`*`))` pairs.

This engraver creates the following layout object(s):

Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.3 [AccidentalPlacement], page 271 and Section 3.1.4 [AccidentalSuggestion], page 272.

`Section 2.2.5 [Axis_group_engraver], page 220`
: Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

Section 2.2.7 [Bar_engraver], page 220
: Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point.

Properties (read)

`whichBar` (string)
: This property is read to determine what type of bar line to create.

Example:

```
\set Staff.whichBar = "|:"
```

This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.11 [BarLine], page 277.

Section 2.2.16 [Clef_engraver], page 224
: Determine and set reference point for pitches.

Properties (read)

`clefGlyph` (string)
: Name of the symbol within the music font.

`clefOctavation` (integer)
: Add this much extra octavation. Values of 7 and -7 are common.

`clefPosition` (number)
: Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`forceClef` (boolean)
: Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):

Section 3.1.25 [Clef], page 288 and Section 3.1.73 [OctavateEight], page 328.

Section 2.2.18 [Collision_engraver], page 224
: Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

  This engraver creates the following layout object(s):

  Section 3.1.68 [NoteCollision], page 325.

Section 2.2.21 [Custos_engraver], page 225
: Engrave custodes.

  This engraver creates the following layout object(s):

  Section 3.1.29 [Custos], page 292.

Section 2.2.23 [Dot_column_engraver], page 226
: Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

  This engraver creates the following layout object(s):

  Section 3.1.30 [DotColumn], page 292.

Section 2.2.33 [Figured_bass_engraver], page 229
: Make figured bass numbers.

  Music types accepted:

  Section 1.2.6 [bass-figure-event], page 38 and Section 1.2.48 [rest-event], page 43

  Properties (read)

  `figuredBassAlterationDirection` (direction)
  : Where to put alterations relative to the main figure.

  `figuredBassCenterContinuations` (boolean)
  : Whether to vertically center pairs of extender lines. This does not work with three or more lines.

  `figuredBassFormatter` (procedure)
  : A routine generating a markup for a bass figure.

  `ignoreFiguredBassRest` (boolean)
  : Don't swallow rest events.

  `implicitBassFigures` (list)
  : A list of bass figures that are not printed as numbers, but only as extender lines.

  `useBassFigureExtenders` (boolean)
  : Whether to use extender lines for repeated bass figures.

  This engraver creates the following layout object(s):

  Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigure-Alignment], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282 and Section 3.1.18 [BassFigureLine], page 283.

Section 2.2.34 [Figured_bass_position_engraver], page 229
: Position figured bass alignments over notes.

This engraver creates the following layout object(s):

Section 3.1.15 [BassFigureAlignmentPositioning], page 281.

Section 2.2.36 [Font_size_engraver], page 230
Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.45 [Grob_pq_engraver], page 233
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.49 [Instrument_name_engraver], page 234
Create a system start text for instrument or vocal names.

Properties (read)

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

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

`shortInstrumentName` (markup)
See `instrumentName`.

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

`vocalName` (markup)
Name of a vocal line.

This engraver creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308.

Section 2.2.52 [Key_engraver], page 235
Engrave a key signature.

Music types accepted:

Section 1.2.25 [key-change-event], page 40

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 changing from a non-natural to another non-natural.

`keyAlterationOrder` (list)
: An alist that defines in what order alterations should be printed. The format is `(`*`step`*` . `*`alter`*`)`, where *step* is a number from 0 to 6 and *alter* from -2 (sharp) to 2 (flat).

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`lastKeySignature` (list)
: Last key signature before a key signature change.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`lastKeySignature` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
: The tonic of the current scale.

This engraver creates the following layout object(s):

Section 3.1.49 [KeyCancellation], page 310 and Section 3.1.50 [KeySignature], page 311.

Section 2.2.55 [Ledger_line_engraver], page 236

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):

Section 3.1.53 [LedgerLineSpanner], page 313.

Section 2.2.72 [Ottava_spanner_engraver], page 241

Create a text spanner when the ottavation property changes.

Properties (read)

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

`middleCOffset` (number)
: The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):

Section 3.1.74 [OttavaBracket], page 329.

Section 2.2.73 [Output_property_engraver], page 242

Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

Section 2.2.80 [Piano_pedal_align_engraver], page 244

Align piano pedal symbols and brackets.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.104 [SustainPedalLineSpanner], page 354 and Section 3.1.123 [UnaCordaPedalLineSpanner], page 372.

Section 2.2.81 [Piano_pedal_engraver], page 245

Engrave piano pedal symbols and brackets.

Music types accepted:

Section 1.2.55 [sostenuto-event], page 44, Section 1.2.63 [sustain-event], page 46 and Section 1.2.71 [una-corda-event], page 46

Properties (read)

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

`pedalSostenutoStrings` (list)
: See `pedalSustainStrings`.

`pedalSostenutoStyle` (symbol)
: See `pedalSustainStyle`.

`pedalSustainStrings` (list)
: A list of strings to print for sustain-pedal. Format is `(up updown down)`, where each of the three is the string to print when this is done with the pedal.

`pedalSustainStyle` (symbol)
: A symbol that indicates how to print sustain pedals: `text`, `bracket` or `mixed` (both).

`pedalUnaCordaStrings` (list)
: See `pedalSustainStrings`.

`pedalUnaCordaStyle` (symbol)
: See `pedalSustainStyle`.

This engraver creates the following layout object(s):

Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.103 [SustainPedal], page 353 and Section 3.1.122 [UnaCordaPedal], page 371.

Section 2.2.87 [Rest_collision_engraver], page 246

Handle collisions of rests.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.86 [RestCollision], page 339.

Section 2.2.93 [Script_row_engraver], page 248

Determine order in horizontal side position elements.

This engraver creates the following layout object(s):

Section 3.1.89 [ScriptRow], page 341.

Section 2.2.94 [Separating_line_group_engraver], page 248

Generate objects for computing spacing parameters.

Properties (read)

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.96 [StaffSpacing], page 347.

Section 2.2.102 [Staff_collecting_engraver], page 250
: Maintain the `stavesFound` variable.

Properties (read)

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

Properties (write)

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

Section 2.2.104 [Staff_symbol_engraver], page 251
: Create the constellation of five (default) staff lines.

Music types accepted:

Section 1.2.59 [staff-span-event], page 45

This engraver creates the following layout object(s):

Section 3.1.97 [StaffSymbol], page 347.

### 2.1.26 VaticanaVoice

Same as `Voice` context, except that it is accommodated for typesetting Gregorian Chant in the notational style of Editio Vaticana.

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

Voice.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276, Section 3.1.19 [Beam], page 283, Section 3.1.20 [BendAfter], page 285, Section 3.1.23 [BreathingSign], page 287, Section 3.1.26 [ClusterSpanner], page 289, Section 3.1.27 [ClusterSpannerBeacon], page 290, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.30 [DotColumn], page 292, Section 3.1.31 [Dots], page 293, Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.37 [Episema], page 299, Section 3.1.38 [Fingering], page 300, Section 3.1.40 [Glissando], page 303, Section 3.1.44 [Hairpin], page 305, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.51 [LaissezVibrerTie], page 312, Section 3.1.52 [LaissezVibrerTieColumn], page 313, Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.69 [NoteColumn], page 326, Section 3.1.70 [NoteHead], page 326, Section 3.1.72 [NoteSpacing], page 327, Section 3.1.77 [PercentRepeat], page 331, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.79 [PhrasingSlur], page 333, Section 3.1.82 [RepeatSlash], page 337, Section 3.1.83 [RepeatTie], page 337, Section 3.1.84 [RepeatTieColumn], page 338, Section 3.1.85 [Rest], page 339, Section 3.1.87 [Script], page 339, Section 3.1.88 [ScriptColumn], page 340, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352, Section 3.1.111 [TextScript], page 360, Section 3.1.113 [Tie], page 362, Section 3.1.114 [TieColumn], page 364, Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.118 [TrillPitchHead], page 367, Section 3.1.119 [TrillSpanner], page 368,

Section 3.1.120 [TupletBracket], page 369, Section 3.1.121 [TupletNumber], page 370, Section 3.1.124 [VaticanaLigature], page 373 and Section 3.1.127 [VoiceFollower], page 375.

This context sets the following properties:

- Set grob-property `padding` in Section 3.1.87 [Script], page 339 to `0.5`.
- Set grob-property `style` in Section 3.1.70 [NoteHead], page 326 to `'vaticana.punctum`.
- Set translator property `autoBeaming` to `#f`.
- Set translator property `localKeySignature` to `'()`.

This context is a 'bottom' context; it cannot contain other contexts.

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

Section 2.2.3 [Arpeggio_engraver], page 219
: Generate an Arpeggio symbol.

  Music types accepted:

  Section 1.2.4 [arpeggio-event], page 38

  This engraver creates the following layout object(s):

  Section 3.1.9 [Arpeggio], page 276.

Section 2.2.4 [Auto_beam_engraver], page 219
: Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.107 [Stem_engraver], page 251 properties `stemLeftBeamCount` and `stemRightBeamCount`.

  Music types accepted:

  Section 1.2.8 [beam-forbid-event], page 39

  Properties (read)

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

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

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

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

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

  This engraver creates the following layout object(s):

  Section 3.1.19 [Beam], page 283.

Section 2.2.9 [Beam_engraver], page 221
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.11 [Bend_engraver], page 222`

Create fall spanners.

Music types accepted:

Section 1.2.9 [bend-after-event], page 39

This engraver creates the following layout object(s):

Section 3.1.20 [BendAfter], page 285.

`Section 2.2.13 [Breathing_sign_engraver], page 223`

Create a breathing sign.

Music types accepted:

Section 1.2.13 [breathing-event], page 39

This engraver creates the following layout object(s):

Section 3.1.23 [BreathingSign], page 287.

`Section 2.2.15 [Chord_tremolo_engraver], page 223`

Generate beams for tremolo repeats.

Music types accepted:

Section 1.2.68 [tremolo-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.17 [Cluster_spanner_engraver], page 224`

Engrave a cluster using `Spanner` notation.

Music types accepted:

Section 1.2.14 [cluster-note-event], page 39

This engraver creates the following layout object(s):

Section 3.1.26 [ClusterSpanner], page 289 and Section 3.1.27 [ClusterSpannerBeacon], page 290.

Section 2.2.24 [Dots_engraver], page 226
: Create Section 3.1.31 [Dots], page 293 objects for Section 3.2.82 [rhythmic-head-interface], page 419s.

  This engraver creates the following layout object(s):

  Section 3.1.31 [Dots], page 293.

Section 2.2.27 [Dynamic_align_engraver], page 227
: Align hairpins and dynamic texts on a horizontal line.

  Music types accepted:

  Section 1.2.12 [break-span-event], page 39

  Properties (read)

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

  This engraver creates the following layout object(s):

  Section 3.1.34 [DynamicLineSpanner], page 296.

Section 2.2.31 [Episema_engraver], page 228
: Create an *Editio Vaticana*-style episema line.

  Music types accepted:

  Section 1.2.19 [episema-event], page 40

  This engraver creates the following layout object(s):

  Section 3.1.37 [Episema], page 299.

Section 2.2.35 [Fingering_engraver], page 229
: Create fingering scripts.

  Music types accepted:

  Section 1.2.21 [fingering-event], page 40 and Section 1.2.62 [stroke-finger-event], page 45

  This engraver creates the following layout object(s):

  Section 3.1.38 [Fingering], page 300.

Section 2.2.36 [Font_size_engraver], page 230
: Put `fontSize` into `font-size` grob property.

  Properties (read)

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

Section 2.2.37 [Forbid_line_break_engraver], page 230
: Forbid line breaks when note heads are still playing at some point.

  Properties (read)

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

  Properties (write)

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

Section 2.2.39 [Glissando_engraver], page 231
: Engrave glissandi.

Music types accepted:

Section 1.2.22 [glissando-event], page 40

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303.

Section 2.2.40 [Grace_beam_engraver], page 231
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.41 [Grace_engraver], page 232
: Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

Section 2.2.45 [Grob_pq_engraver], page 233
: Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.50 [Instrument_switch_engraver], page 234
Create a cue text for taking instrument.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.48 [InstrumentSwitch], page 309.

Section 2.2.54 [Laissez_vibrer_engraver], page 236
Create laissez vibrer items.

Music types accepted:

Section 1.2.27 [laissez-vibrer-event], page 40

This engraver creates the following layout object(s):

Section 3.1.51 [LaissezVibrerTie], page 312 and Section 3.1.52 [LaissezVibrerTieColumn], page 313.

Section 2.2.64 [Multi_measure_rest_engraver], page 238
Engrave multi-measure rests that are produced with '`R`'. It reads `measurePosition` and `internalBarNumber` to determine what number to print over the Section 3.1.64 [MultiMeasureRest], page 321. Reads `measureLength` to determine whether it should use a whole rest or a breve rest to represent one measure.

Music types accepted:

Section 1.2.34 [multi-measure-rest-event], page 41 and Section 1.2.35 [multi-measure-text-event], page 41

Properties (read)

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

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322 and Section 3.1.66 [MultiMeasureRestText], page 323.

`Section 2.2.65 [New_dynamic_engraver], page 239`

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:

Section 1.2.1 [absolute-dynamic-event], page 38 and Section 1.2.57 [span-dynamic-event], page 44

Properties (read)

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

`crescendoText` (markup)
: The text to print at start of non-hairpin crescendo, i.e., '`cresc.`'.

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

`decrescendoSpanner` (symbol)
: The type of spanner to be used for decrescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin decrescendo is used.

`decrescendoText` (markup)
: The text to print at start of non-hairpin decrescendo, i.e., '`dim.`'.

This engraver creates the following layout object(s):

Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298 and Section 3.1.44 [Hairpin], page 305.

`Section 2.2.66 [New_fingering_engraver], page 240`

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

Properties (read)

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

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

`stringNumberOrientations` (list)
: See `fingeringOrientations`.

`strokeFingerOrientations` (list)
: See `fingeringOrientations`.

This engraver creates the following layout object(s):

Section 3.1.38 [Fingering], page 300, Section 3.1.87 [Script], page 339, Section 3.1.101 [StringNumber], page 351 and Section 3.1.102 [StrokeFinger], page 352.

Section 2.2.67 [Note_head_line_engraver], page 240
: Engrave a line between two note heads, for example a glissando. If `followVoice` is set, staff switches also generate a line.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303 and Section 3.1.127 [VoiceFollower], page 375.

Section 2.2.68 [Note_heads_engraver], page 240
: Generate note heads.

Music types accepted:

Section 1.2.37 [note-event], page 42

Properties (read)

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

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

This engraver creates the following layout object(s):

Section 3.1.70 [NoteHead], page 326.

Section 2.2.71 [Note_spacing_engraver], page 241
: Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):

Section 3.1.72 [NoteSpacing], page 327.

Section 2.2.73 [Output_property_engraver], page 242
: Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

Section 2.2.77 [Part_combine_engraver], page 243
: Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted:

Section 1.2.41 [part-combine-event], page 42

Properties (read)

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

`printPartCombineTexts` (boolean)
: Set 'Solo' and 'A due' texts in the part combiner?

`soloIIText` (markup)
: The text for the start of a solo for voice 'two' when part-combining.

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

This engraver creates the following layout object(s):

Section 3.1.28 [CombineTextScript], page 290.

`Section 2.2.78 [Percent_repeat_engraver], page 243`

Make whole bar and double bar repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.77 [PercentRepeat], page 331 and Section 3.1.78 [PercentRepeatCounter], page 332.

`Section 2.2.79 [Phrasing_slur_engraver], page 244`

Print phrasing slurs. Similar to Section 2.2.96 [Slur_engraver], page 249.

Music types accepted:

Section 1.2.46 [phrasing-slur-event], page 43

This engraver creates the following layout object(s):

Section 3.1.79 [PhrasingSlur], page 333.

`Section 2.2.84 [Pitched_trill_engraver], page 246`
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s):

Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366 and Section 3.1.118 [TrillPitchHead], page 367.

`Section 2.2.86 [Repeat_tie_engraver], page 246`
Create repeat ties.

Music types accepted:

Section 1.2.47 [repeat-tie-event], page 43

This engraver creates the following layout object(s):

Section 3.1.83 [RepeatTie], page 337 and Section 3.1.84 [RepeatTieColumn], page 338.

`Section 2.2.88 [Rest_engraver], page 247`
Engrave rests.

Music types accepted:

Section 1.2.48 [rest-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.85 [Rest], page 339.

`Section 2.2.89 [Rhythmic_column_engraver], page 247`
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s):

Section 3.1.69 [NoteColumn], page 326.

`Section 2.2.91 [Script_column_engraver], page 247`
Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s):

Section 3.1.88 [ScriptColumn], page 340.

`Section 2.2.92 [Script_engraver], page 248`
Handle note scripted articulations.

Music types accepted:

Section 1.2.5 [articulation-event], page 38

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.87 [Script], page 339.

Section 2.2.95 [Slash_repeat_engraver], page 249

Make beat repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.82 [RepeatSlash], page 337.

Section 2.2.101 [Spanner_break_forbid_engraver], page 250

Forbid breaks in certain spanners.

Section 2.2.113 [Text_engraver], page 254

Create text scripts.

Music types accepted:

Section 1.2.64 [text-script-event], page 46

This engraver creates the following layout object(s):

Section 3.1.111 [TextScript], page 360.

Section 2.2.115 [Tie_engraver], page 254

Generate ties between note heads of equal pitch.

Music types accepted:

Section 1.2.66 [tie-event], page 46

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.

This engraver creates the following layout object(s):

Section 3.1.113 [Tie], page 362 and Section 3.1.114 [TieColumn], page 364.

Section 2.2.121 [Trill_spanner_engraver], page 256

Create trill spanner from an event.

Music types accepted:

Section 1.2.69 [trill-span-event], page 46

Properties (read)

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

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

This engraver creates the following layout object(s):

Section 3.1.119 [TrillSpanner], page 368.

`Section 2.2.122 [Tuplet_engraver], page 256`

Catch tuplet events and generate appropriate bracket.

Music types accepted:

Section 1.2.70 [tuplet-span-event], page 46

Properties (read)

`tupletFullLength` (boolean)
: If set, the tuplet is printed up to the start of the next note.

`tupletFullLengthNote` (boolean)
: If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

This engraver creates the following layout object(s):

Section 3.1.120 [TupletBracket], page 369 and Section 3.1.121 [TupletNumber], page 370.

`Section 2.2.123 [Tweak_engraver], page 257`

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

`Section 2.2.124 [Vaticana_ligature_engraver], page 257`

Handle ligatures by glueing special ligature heads together.

Music types accepted:

Section 1.2.29 [ligature-event], page 41 and Section 1.2.45 [pes-or-flexa-event], page 43

This engraver creates the following layout object(s):

Section 3.1.30 [DotColumn], page 292 and Section 3.1.124 [VaticanaLigature], page 373.

### 2.1.27 Voice

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

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

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276, Section 3.1.19 [Beam], page 283, Section 3.1.20 [BendAfter], page 285, Section 3.1.23 [BreathingSign], page 287, Section 3.1.26 [ClusterSpanner], page 289, Section 3.1.27 [ClusterSpannerBeacon], page 290, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.31 [Dots], page 293, Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.34

[DynamicLineSpanner], page 296, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.38 [Fingering], page 300, Section 3.1.40 [Glissando], page 303, Section 3.1.44 [Hairpin], page 305, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.51 [LaissezVibrerTie], page 312, Section 3.1.52 [LaissezVibrerTieColumn], page 313, Section 3.1.55 [LigatureBracket], page 314, Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.69 [NoteColumn], page 326, Section 3.1.70 [NoteHead], page 326, Section 3.1.72 [NoteSpacing], page 327, Section 3.1.77 [PercentRepeat], page 331, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.79 [PhrasingSlur], page 333, Section 3.1.82 [RepeatSlash], page 337, Section 3.1.83 [RepeatTie], page 337, Section 3.1.84 [RepeatTieColumn], page 338, Section 3.1.85 [Rest], page 339, Section 3.1.87 [Script], page 339, Section 3.1.88 [ScriptColumn], page 340, Section 3.1.90 [Slur], page 341, Section 3.1.99 [Stem], page 348, Section 3.1.100 [StemTremolo], page 350, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352, Section 3.1.111 [TextScript], page 360, Section 3.1.112 [TextSpanner], page 361, Section 3.1.113 [Tie], page 362, Section 3.1.114 [TieColumn], page 364, Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.118 [TrillPitchHead], page 367, Section 3.1.119 [TrillSpanner], page 368, Section 3.1.120 [TupletBracket], page 369, Section 3.1.121 [TupletNumber], page 370 and Section 3.1.127 [VoiceFollower], page 375.

This context sets the following properties:

- Set translator property `localKeySignature` to `'()`.

This context is a 'bottom' context; it cannot contain other contexts.

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

`Section 2.2.3 [Arpeggio_engraver], page 219`

Generate an Arpeggio symbol.

Music types accepted:

Section 1.2.4 [arpeggio-event], page 38

This engraver creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276.

`Section 2.2.4 [Auto_beam_engraver], page 219`

Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.107 [Stem_engraver], page 251 properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted:

Section 1.2.8 [beam-forbid-event], page 39

Properties (read)

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

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.9 [Beam_engraver], page 221`
: Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.11 [Bend_engraver], page 222`
: Create fall spanners.

Music types accepted:

Section 1.2.9 [bend-after-event], page 39

This engraver creates the following layout object(s):

Section 3.1.20 [BendAfter], page 285.

`Section 2.2.13 [Breathing_sign_engraver], page 223`
: Create a breathing sign.

Music types accepted:

Section 1.2.13 [breathing-event], page 39

This engraver creates the following layout object(s):

Section 3.1.23 [BreathingSign], page 287.

Section 2.2.15 [Chord_tremolo_engraver], page 223
Generate beams for tremolo repeats.

Music types accepted:

Section 1.2.68 [tremolo-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

Section 2.2.17 [Cluster_spanner_engraver], page 224
Engrave a cluster using `Spanner` notation.

Music types accepted:

Section 1.2.14 [cluster-note-event], page 39

This engraver creates the following layout object(s):

Section 3.1.26 [ClusterSpanner], page 289 and Section 3.1.27 [ClusterSpannerBeacon], page 290.

Section 2.2.24 [Dots_engraver], page 226
Create Section 3.1.31 [Dots], page 293 objects for Section 3.2.82 [rhythmic-head-interface], page 419s.

This engraver creates the following layout object(s):

Section 3.1.31 [Dots], page 293.

Section 2.2.27 [Dynamic_align_engraver], page 227
Align hairpins and dynamic texts on a horizontal line.

Music types accepted:

Section 1.2.12 [break-span-event], page 39

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.34 [DynamicLineSpanner], page 296.

Section 2.2.35 [Fingering_engraver], page 229
Create fingering scripts.

Music types accepted:

Section 1.2.21 [fingering-event], page 40 and Section 1.2.62 [stroke-finger-event], page 45

This engraver creates the following layout object(s):

Section 3.1.38 [Fingering], page 300.

Section 2.2.36 [Font_size_engraver], page 230
Put `fontSize` into `font-size` grob property.

Properties (read)

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

Section 2.2.37 [Forbid_line_break_engraver], page 230
Forbid line breaks when note heads are still playing at some point.

Properties (read)

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

Properties (write)

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

`Section 2.2.39 [Glissando_engraver], page 231`
Engrave glissandi.

Music types accepted:

Section 1.2.22 [glissando-event], page 40

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303.

`Section 2.2.40 [Grace_beam_engraver], page 231`
Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Section 2.2.41 [Grace_engraver], page 232`
Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Section 2.2.45 [Grob_pq_engraver], page 233`
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

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

Properties (write)

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

Section 2.2.50 [Instrument_switch_engraver], page 234
: Create a cue text for taking instrument.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.48 [InstrumentSwitch], page 309.

Section 2.2.54 [Laissez_vibrer_engraver], page 236
: Create laissez vibrer items.

Music types accepted:

Section 1.2.27 [laissez-vibrer-event], page 40

This engraver creates the following layout object(s):

Section 3.1.51 [LaissezVibrerTie], page 312 and Section 3.1.52 [LaissezVibrerTieColumn], page 313.

Section 2.2.56 [Ligature_bracket_engraver], page 236
: Handle `Ligature_events` by engraving `Ligature` brackets.

Music types accepted:

Section 1.2.29 [ligature-event], page 41

This engraver creates the following layout object(s):

Section 3.1.55 [LigatureBracket], page 314.

Section 2.2.64 [Multi_measure_rest_engraver], page 238
: Engrave multi-measure rests that are produced with '`R`'. It reads `measurePosition` and `internalBarNumber` to determine what number to print over the Section 3.1.64 [MultiMeasureRest], page 321. Reads `measureLength` to determine whether it should use a whole rest or a breve rest to represent one measure.

Music types accepted:

Section 1.2.34 [multi-measure-rest-event], page 41 and Section 1.2.35 [multi-measure-text-event], page 41

Properties (read)

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

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322 and Section 3.1.66 [MultiMeasureRestText], page 323.

`Section 2.2.65 [New_dynamic_engraver], page 239`

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:

Section 1.2.1 [absolute-dynamic-event], page 38 and Section 1.2.57 [span-dynamic-event], page 44

Properties (read)

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

`crescendoText` (markup)
: The text to print at start of non-hairpin crescendo, i.e., '`cresc.`'.

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

`decrescendoSpanner` (symbol)
: The type of spanner to be used for decrescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin decrescendo is used.

`decrescendoText` (markup)
: The text to print at start of non-hairpin decrescendo, i.e., '`dim.`'.

This engraver creates the following layout object(s):

Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298 and Section 3.1.44 [Hairpin], page 305.

Section 2.2.66 [New_fingering_engraver], page 240
Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

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

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

`stringNumberOrientations` (list)
See `fingeringOrientations`.

`strokeFingerOrientations` (list)
See `fingeringOrientations`.

This engraver creates the following layout object(s):

Section 3.1.38 [Fingering], page 300, Section 3.1.87 [Script], page 339, Section 3.1.101 [StringNumber], page 351 and Section 3.1.102 [StrokeFinger], page 352.

Section 2.2.67 [Note_head_line_engraver], page 240
Engrave a line between two note heads, for example a glissando. If `followVoice` is set, staff switches also generate a line.

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303 and Section 3.1.127 [VoiceFollower], page 375.

Section 2.2.68 [Note_heads_engraver], page 240
Generate note heads.

Music types accepted:

Section 1.2.37 [note-event], page 42

Properties (read)

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

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

This engraver creates the following layout object(s):

Section 3.1.70 [NoteHead], page 326.

Section 2.2.71 [Note_spacing_engraver], page 241
Generate NoteSpacing, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):

Section 3.1.72 [NoteSpacing], page 327.

Section 2.2.73 [Output_property_engraver], page 242
Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

Section 2.2.77 [Part_combine_engraver], page 243
Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted:

Section 1.2.41 [part-combine-event], page 42

Properties (read)

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

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

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

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

This engraver creates the following layout object(s):

Section 3.1.28 [CombineTextScript], page 290.

Section 2.2.78 [Percent_repeat_engraver], page 243
Make whole bar and double bar repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

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

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

repeatCountVisibility (procedure)
A procedure taking as arguments an integer and context, returning whether the corresponding

percent repeat number should be printed when `countPercentRepeats` is set.

Properties (write)

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

This engraver creates the following layout object(s):

Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.77 [PercentRepeat], page 331 and Section 3.1.78 [PercentRepeatCounter], page 332.

`Section 2.2.79 [Phrasing_slur_engraver], page 244`
Print phrasing slurs. Similar to Section 2.2.96 [Slur_engraver], page 249.

Music types accepted:

Section 1.2.46 [phrasing-slur-event], page 43

This engraver creates the following layout object(s):

Section 3.1.79 [PhrasingSlur], page 333.

`Section 2.2.84 [Pitched_trill_engraver], page 246`
Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s):

Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366 and Section 3.1.118 [TrillPitchHead], page 367.

`Section 2.2.86 [Repeat_tie_engraver], page 246`
Create repeat ties.

Music types accepted:

Section 1.2.47 [repeat-tie-event], page 43

This engraver creates the following layout object(s):

Section 3.1.83 [RepeatTie], page 337 and Section 3.1.84 [RepeatTieColumn], page 338.

`Section 2.2.88 [Rest_engraver], page 247`
Engrave rests.

Music types accepted:

Section 1.2.48 [rest-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.85 [Rest], page 339.

`Section 2.2.89 [Rhythmic_column_engraver], page 247`
Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s):

Section 3.1.69 [NoteColumn], page 326.

Section 2.2.91 [Script_column_engraver], page 247
Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s):

Section 3.1.88 [ScriptColumn], page 340.

Section 2.2.92 [Script_engraver], page 248
Handle note scripted articulations.

Music types accepted:

Section 1.2.5 [articulation-event], page 38

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.87 [Script], page 339.

Section 2.2.95 [Slash_repeat_engraver], page 249
Make beat repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

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

This engraver creates the following layout object(s):

Section 3.1.82 [RepeatSlash], page 337.

Section 2.2.96 [Slur_engraver], page 249
Build slur grobs from slur events.

Music types accepted:

Section 1.2.52 [slur-event], page 44

Properties (read)

`doubleSlurs` (boolean)
If set, two slurs are created for every slurred note, one above and one below the chord.

`slurMelismaBusy` (boolean)
Signal if a slur is present.

This engraver creates the following layout object(s):

Section 3.1.90 [Slur], page 341.

Section 2.2.101 [Spanner_break_forbid_engraver], page 250
Forbid breaks in certain spanners.

Section 2.2.107 [Stem_engraver], page 251
Create stems and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:

Section 1.2.67 [tremolo-event], page 46

Properties (read)

`stemLeftBeamCount` (integer)
: Specify the number of beams to draw on the left side of the next note. Overrides automatic beaming. The value is only used once, and then it is erased.

`stemRightBeamCount` (integer)
: See `stemLeftBeamCount`.

`tremoloFlags` (integer)
: The number of tremolo flags to add if no number is specified.

This engraver creates the following layout object(s):

Section 3.1.99 [Stem], page 348 and Section 3.1.100 [StemTremolo], page 350.

Section 2.2.113 [Text_engraver], page 254
Create text scripts.

Music types accepted:

Section 1.2.64 [text-script-event], page 46

This engraver creates the following layout object(s):

Section 3.1.111 [TextScript], page 360.

Section 2.2.114 [Text_spanner_engraver], page 254
Create text spanner from an event.

Music types accepted:

Section 1.2.65 [text-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.112 [TextSpanner], page 361.

Section 2.2.115 [Tie_engraver], page 254
Generate ties between note heads of equal pitch.

Music types accepted:

Section 1.2.66 [tie-event], page 46

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.

This engraver creates the following layout object(s):

Section 3.1.113 [Tie], page 362 and Section 3.1.114 [TieColumn], page 364.

Section 2.2.121 [Trill_spanner_engraver], page 256
: Create trill spanner from an event.

  Music types accepted:

  Section 1.2.69 [trill-span-event], page 46

  Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  : Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `currentMusicalColumn` (graphical (layout) object)
  : Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

  This engraver creates the following layout object(s):

  Section 3.1.119 [TrillSpanner], page 368.

Section 2.2.122 [Tuplet_engraver], page 256
: Catch tuplet events and generate appropriate bracket.

  Music types accepted:

  Section 1.2.70 [tuplet-span-event], page 46

  Properties (read)

  `tupletFullLength` (boolean)
  : If set, the tuplet is printed up to the start of the next note.

  `tupletFullLengthNote` (boolean)
  : If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

  This engraver creates the following layout object(s):

  Section 3.1.120 [TupletBracket], page 369 and Section 3.1.121 [TupletNumber], page 370.

Section 2.2.123 [Tweak_engraver], page 257
: Read the `tweaks` property from the originating event, and set properties.

## 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)

`autoAccidentals` (list)
: List of different ways to typeset an accidental.

  For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used.

  Each entry in the list is either a symbol or a procedure.

*symbol* The symbol is the name of the context in which the following rules are to be applied. For example, if *context* is Section "Score" in *Internals Reference* then all staves share accidentals, and if *context* is Section "Staff" in *Internals Reference* then all voices in the same staff share accidentals, but staves do not.

*procedure* The procedure represents an accidental rule to be applied to the previously specified context.

The procedure takes the following arguments:

`context` The current context to which the rule should be applied.

`pitch` The pitch of the note to be evaluated.

`barnum` The current bar number.

`measurepos` The current measure position.

The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. `(#t . #f)` does not make sense.

`autoCautionaries` (list)
: List similar to `autoAccidentals`, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

`extraNatural` (boolean)
: Whether to typeset an extra natural sign before accidentals changing from a non-natural to another non-natural.

`harmonicAccidentals` (boolean)
: If set, harmonic notes in chords get accidentals.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`localKeySignature` (list)
: The key signature at this point in the measure. The format is the same as for `keySignature`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber`*` . `*`measureposition`*`))` pairs.

Properties (write)

`localKeySignature` (list)
: The key signature at this point in the measure. The format is the same as for `keySignature`, but can also contain `((`*`octave`*` . `*`name`*`) . (`*`alter barnumber`*` . `*`measureposition`*`))` pairs.

This engraver creates the following layout object(s):

Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.3 [AccidentalPlacement], page 271 and Section 3.1.4 [AccidentalSuggestion], page 272.

`Accidental_engraver` is part of the following context(s): Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.21 [Staff], page 155 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.2 Ambitus_engraver

Create an ambitus.

Properties (read)

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

This engraver creates the following layout object(s):

Section 3.1.3 [AccidentalPlacement], page 271, Section 3.1.5 [Ambitus], page 273, Section 3.1.6 [AmbitusAccidental], page 274, Section 3.1.7 [AmbitusLine], page 275 and Section 3.1.8 [AmbitusNoteHead], page 275.

`Ambitus_engraver` is not part of any context.

### 2.2.3 Arpeggio_engraver

Generate an Arpeggio symbol.

Music types accepted:

Section 1.2.4 [arpeggio-event], page 38

This engraver creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276.

`Arpeggio_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.4 Auto_beam_engraver

Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.107 [Stem_engraver], page 251 properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted:

Section 1.2.8 [beam-forbid-event], page 39

Properties (read)

`autoBeaming` (boolean)
: If set to true then beams are generated automatically.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamExceptions` (list)
: An alist of exceptions to autobeam rules that normally end on beats.

`beatStructure` (list)
: List of `baseMoments` that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Auto_beam_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.5 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 (clef, key signature, etc.) items.

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

`Axis_group_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.7 [Dynamics], page 83, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.17 [NoteNames], page 137, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.6 Balloon_engraver

Create balloon texts.

Music types accepted:

Section 1.2.2 [annotate-output-event], page 38

This engraver creates the following layout object(s):

Section 3.1.10 [BalloonTextItem], page 277.

`Balloon_engraver` is not part of any context.

### 2.2.7 Bar_engraver

Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point.

Properties (read)

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

```
\set Staff.whichBar = "|:"
```

This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

Properties (write)

`forbidBreak` (boolean)
: If set to `##t`, prevent a line break at this point.

This engraver creates the following layout object(s):

Section 3.1.11 [BarLine], page 277.

`Bar_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.7 [Dynamics], page 83, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.8 Bar_number_engraver

A bar number is created whenever `measurePosition` is zero and when there is a bar line (i.e., when `whichBar` is set). It is put on top of all staves, and appears only at the left side of the staff. The staves are taken from `stavesFound`, which is maintained by Section 2.2.102 [Staff_collecting_engraver], page 250.

Properties (read)

`barNumberVisibility` (procedure)
: A Procedure that takes an integer and returns whether the corresponding bar number should be printed.

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

```
\set Staff.whichBar = "|:"
```

  This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

This engraver creates the following layout object(s):

Section 3.1.12 [BarNumber], page 279.

`Bar_number_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.9 Beam_engraver

Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoments` that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
: If set to `##t`, prevent a line break at this point.

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Beam_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.10 Beam_performer

Music types accepted:

Section 1.2.7 [beam-event], page 38

`Beam_performer` is not part of any context.

### 2.2.11 Bend_engraver

Create fall spanners.

Music types accepted:

Section 1.2.9 [bend-after-event], page 39

This engraver creates the following layout object(s):

Section 3.1.20 [BendAfter], page 285.

`Bend_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.12 Break_align_engraver

Align grobs with corresponding `break-align-symbols` into groups, and order the groups according to `breakAlignOrder`. The left edge of the alignment gets a separate group, with a symbol `left-edge`.

This engraver creates the following layout object(s):

Section 3.1.21 [BreakAlignGroup], page 285, Section 3.1.22 [BreakAlignment], page 286 and Section 3.1.54 [LeftEdge], page 314.

`Break_align_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.13 Breathing_sign_engraver

Create a breathing sign.

Music types accepted:

Section 1.2.13 [breathing-event], page 39

This engraver creates the following layout object(s):

Section 3.1.23 [BreathingSign], page 287.

`Breathing_sign_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.14 Chord_name_engraver

Catch note and rest events and generate the appropriate chordname.

Music types accepted:

Section 1.2.37 [note-event], page 42 and Section 1.2.48 [rest-event], page 43

Properties (read)

`chordChanges` (boolean)
: Only show changes in chords scheme?

`chordNameExceptions` (list)
: An alist of chord exceptions. Contains `(`*`chord . markup`*`)` entries.

`chordNameExceptions` (list)
: An alist of chord exceptions. Contains `(`*`chord . markup`*`)` entries.

`chordNameFunction` (procedure)
: The function that converts lists of pitches to chord names.

`chordNoteNamer` (procedure)
: A function that converts from a pitch object to a text markup. Used for single pitches.

`chordRootNamer` (procedure)
: A function that converts from a pitch object to a text markup. Used for chords.

`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.

This engraver creates the following layout object(s):

Section 3.1.24 [ChordName], page 287.

`Chord_name_engraver` is part of the following context(s): Section 2.1.2 [ChordNames], page 53.

### 2.2.15 Chord_tremolo_engraver

Generate beams for tremolo repeats.

Music types accepted:

Section 1.2.68 [tremolo-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Chord_tremolo_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.16 Clef_engraver

Determine and set reference point for pitches.

Properties (read)

`clefGlyph` (string)
: Name of the symbol within the music font.

`clefOctavation` (integer)
: Add this much extra octavation. Values of 7 and -7 are common.

`clefPosition` (number)
: Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for clef changes.

`forceClef` (boolean)
: Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):

Section 3.1.25 [Clef], page 288 and Section 3.1.73 [OctavateEight], page 328.

`Clef_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.17 Cluster_spanner_engraver

Engrave a cluster using `Spanner` notation.

Music types accepted:

Section 1.2.14 [cluster-note-event], page 39

This engraver creates the following layout object(s):

Section 3.1.26 [ClusterSpanner], page 289 and Section 3.1.27 [ClusterSpannerBeacon], page 290.

`Cluster_spanner_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.18 Collision_engraver

Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s):

Section 3.1.68 [NoteCollision], page 325.

`Collision_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115,

Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.19 Completion_heads_engraver

This engraver replaces `Note_heads_engraver`. It plays some trickery to break long notes and automatically tie them into the next measure.

Music types accepted:

Section 1.2.37 [note-event], page 42 and Section 1.2.66 [tie-event], page 46

Properties (read)

`measureLength` (moment)
: Length of one measure in the current time signature.

`measurePosition` (moment)
: How much of the current measure have we had. This can be set manually to create incomplete measures.

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

Properties (write)

`completionBusy` (boolean)
: Whether a completion-note head is playing.

This engraver creates the following layout object(s):

Section 3.1.31 [Dots], page 293, Section 3.1.70 [NoteHead], page 326 and Section 3.1.113 [Tie], page 362.

`Completion_heads_engraver` is not part of any context.

### 2.2.20 Control_track_performer

`Control_track_performer` is not part of any context.

### 2.2.21 Custos_engraver

Engrave custodes.

This engraver creates the following layout object(s):

Section 3.1.29 [Custos], page 292.

`Custos_engraver` is part of the following context(s): Section 2.1.15 [MensuralStaff], page 115 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.22 Default_bar_line_engraver

This engraver determines what kind of automatic bar lines should be produced, and sets `whichBar` accordingly. It should be at the same level as Section 2.2.119 [Timing_translator], page 255.

Properties (read)

`automaticBars` (boolean)
: If set to false then bar lines will not be printed automatically; they must be explicitly created with a `\bar` command. Unlike the `\cadenzaOn` keyword, measures are still counted. Bar line generation will resume according to that count if this property is unset.

`barAlways` (boolean)
: If set to true a bar line is drawn after each note.

`defaultBarType` (string)
: Set the default type of bar line. See `whichBar` for information on available bar types.

  This variable is read by Section "Timing_translator" in *Internals Reference* at Section "Score" in *Internals Reference* level.

`measureLength` (moment)
: Length of one measure in the current time signature.

`measurePosition` (moment)
: How much of the current measure have we had. This can be set manually to create incomplete measures.

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

```
\set Staff.whichBar = "|:"
```

  This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

Properties (write)

`automaticBars` (boolean)
: If set to false then bar lines will not be printed automatically; they must be explicitly created with a `\bar` command. Unlike the `\cadenzaOn` keyword, measures are still counted. Bar line generation will resume according to that count if this property is unset.

`Default_bar_line_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.23 Dot_column_engraver

Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s):

Section 3.1.30 [DotColumn], page 292.

`Dot_column_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.24 Dots_engraver

Create Section 3.1.31 [Dots], page 293 objects for Section 3.2.82 [rhythmic-head-interface], page 419s.

This engraver creates the following layout object(s):

Section 3.1.31 [Dots], page 293.

`Dots_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.25 Drum_note_performer

Play drum notes.

Music types accepted:

Section 1.2.37 [note-event], page 42

`Drum_note_performer` is not part of any context.

### 2.2.26 Drum_notes_engraver

Generate drum note heads.

Music types accepted:

Section 1.2.37 [note-event], page 42

Properties (read)

`drumStyleTable` (hash table)
: A hash table which maps drums to layout settings. Predefined values: '`drums-style`', '`timbales-style`', '`congas-style`', '`bongos-style`', and '`percussion-style`'.

  The layout style is a hash table, containing the drum-pitches (e.g., the symbol '`hihat`') as keys, and a list `(`*`notehead-style script vertical-position`*`)` as values.

This engraver creates the following layout object(s):

Section 3.1.70 [NoteHead], page 326 and Section 3.1.87 [Script], page 339.

`Drum_notes_engraver` is part of the following context(s): Section 2.1.6 [DrumVoice], page 72.

### 2.2.27 Dynamic_align_engraver

Align hairpins and dynamic texts on a horizontal line.

Music types accepted:

Section 1.2.12 [break-span-event], page 39

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):

Section 3.1.34 [DynamicLineSpanner], page 296.

`Dynamic_align_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.7 [Dynamics], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.28 Dynamic_engraver

Create hairpins, dynamic texts, and their vertical alignments. The symbols are collected onto a `DynamicLineSpanner` grob which takes care of vertical positioning.

Music types accepted:

Section 1.2.1 [absolute-dynamic-event], page 38 and Section 1.2.57 [span-dynamic-event], page 44

This engraver creates the following layout object(s):

Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298 and Section 3.1.44 [Hairpin], page 305.

`Dynamic_engraver` is not part of any context.

### 2.2.29 Dynamic_performer

Music types accepted:

Section 1.2.1 [absolute-dynamic-event], page 38, Section 1.2.16 [crescendo-event], page 39 and Section 1.2.17 [decrescendo-event], page 39

Properties (read)

`dynamicAbsoluteVolumeFunction` (procedure)
: A procedure that takes one argument, the text value of a dynamic event, and returns the absolute volume of that dynamic event.

`instrumentEqualizer` (procedure)
: A function taking a string (instrument name), and returning a `(`*`min . max`*`)` pair of numbers for the loudness range of the instrument.

`midiInstrument` (string)
: Name of the MIDI instrument to use.

`midiMaximumVolume` (number)
: Analogous to `midiMinimumVolume`.

`midiMinimumVolume` (number)
: Set the minimum loudness for MIDI. Ranges from 0 to 1.

`Dynamic_performer` is not part of any context.

### 2.2.30 Engraver

Base class for engravers. Does nothing, so it is not used.

`Engraver` is not part of any context.

### 2.2.31 Episema_engraver

Create an *Editio Vaticana*-style episema line.

Music types accepted:

Section 1.2.19 [episema-event], page 40

This engraver creates the following layout object(s):

Section 3.1.37 [Episema], page 299.

`Episema_engraver` is part of the following context(s): Section 2.1.13 [GregorianTranscriptionVoice], page 100 and Section 2.1.26 [VaticanaVoice], page 194.

### 2.2.32 Extender_engraver

Create lyric extenders.

Music types accepted:

Section 1.2.15 [completize-extender-event], page 39 and Section 1.2.20 [extender-event], page 40

Properties (read)

`extendersOverRests` (boolean)
: Whether to continue extenders as they cross a rest.

`includeGraceNotes` (boolean)
: Do not ignore grace notes for Section “Lyrics” in *Internals Reference*.

This engraver creates the following layout object(s):

Section 3.1.56 [LyricExtender], page 315.

`Extender_engraver` is part of the following context(s): Section 2.1.14 [Lyrics], page 113.

### 2.2.33 Figured_bass_engraver

Make figured bass numbers.

Music types accepted:

Section 1.2.6 [bass-figure-event], page 38 and Section 1.2.48 [rest-event], page 43

Properties (read)

`figuredBassAlterationDirection` (direction)
: Where to put alterations relative to the main figure.

`figuredBassCenterContinuations` (boolean)
: Whether to vertically center pairs of extender lines. This does not work with three or more lines.

`figuredBassFormatter` (procedure)
: A routine generating a markup for a bass figure.

`ignoreFiguredBassRest` (boolean)
: Don't swallow rest events.

`implicitBassFigures` (list)
: A list of bass figures that are not printed as numbers, but only as extender lines.

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):

Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282 and Section 3.1.18 [BassFigureLine], page 283.

`Figured_bass_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.8 [FiguredBass], page 86, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.34 Figured_bass_position_engraver

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

Section 3.1.15 [BassFigureAlignmentPositioning], page 281.

`Figured_bass_position_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.35 Fingering_engraver

Create fingering scripts.

Music types accepted:

Section 1.2.21 [fingering-event], page 40 and Section 1.2.62 [stroke-finger-event], page 45

This engraver creates the following layout object(s):

Section 3.1.38 [Fingering], page 300.

`Fingering_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.36 Font_size_engraver

Put `fontSize` into `font-size` grob property.

Properties (read)

`fontSize` (number)
: The relative size of all grobs in a context.

`Font_size_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.5 [DrumStaff], page 67, Section 2.1.6 [DrumVoice], page 72, Section 2.1.9 [FretBoards], page 88, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.14 [Lyrics], page 113, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165, Section 2.1.24 [TabVoice], page 171, Section 2.1.25 [VaticanaStaff], page 185, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.37 Forbid_line_break_engraver

Forbid line breaks when note heads are still playing at some point.

Properties (read)

`busyGrobs` (list)
: A queue of `(`*`end-moment . GROB`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

`forbidBreak` (boolean)
: If set to `##t`, prevent a line break at this point.

`Forbid_line_break_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.38 Fretboard_engraver

Generate fret diagram from one or more events of type `NoteEvent`.

Music types accepted:

Section 1.2.37 [note-event], page 42 and Section 1.2.61 [string-number-event], page 45

Properties (read)

`chordChanges` (boolean)
: Only show changes in chords scheme?

`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 pitch (in semitones) of each string (starting with the lower one).

`tablatureFormat` (procedure)
: A function formatting a tablature note head. Called with three arguments: context, string number and, fret number. It returns the text as a markup.

This engraver creates the following layout object(s):

Section 3.1.39 [FretBoard], page 302.

`Fretboard_engraver` is part of the following context(s): Section 2.1.9 [FretBoards], page 88.

### 2.2.39 Glissando_engraver

Engrave glissandi.

Music types accepted:

Section 1.2.22 [glissando-event], page 40

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303.

`Glissando_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.40 Grace_beam_engraver

Handle `Beam` events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted:

Section 1.2.7 [beam-event], page 38

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`beatStructure` (list)
: List of `baseMoments` that are combined to make beats.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 283.

`Grace_beam_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.41 Grace_engraver

Set font size and other properties for grace notes.

Properties (read)

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`Grace_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.42 Grace_spacing_engraver

Bookkeeping of shortest starting and playing notes in grace note runs.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):

Section 3.1.41 [GraceSpacing], page 304.

`Grace_spacing_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.43 Grid_line_span_engraver

This engraver makes cross-staff lines: It catches all normal lines and draws a single span line across them.

This engraver creates the following layout object(s):

Section 3.1.42 [GridLine], page 304.

`Grid_line_span_engraver` is not part of any context.

### 2.2.44 Grid_point_engraver

Generate grid points.

Properties (read)

`gridInterval` (moment)
: Interval for which to generate `GridPoint`s.

This engraver creates the following layout object(s):

Section 3.1.43 [GridPoint], page 305.

`Grid_point_engraver` is not part of any context.

### 2.2.45 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): Section 2.1.3 [CueVoice], page 54, Section 2.1.5 [DrumStaff], page 67, Section 2.1.6 [DrumVoice], page 72, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165, Section 2.1.24 [TabVoice], page 171, Section 2.1.25 [VaticanaStaff], page 185, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.46 Hara_kiri_engraver

Like `Axis_group_engraver`, but make a hara-kiri spanner, and add interesting items (i.e., note heads, lyric syllables, and normal rests).

Properties (read)

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

This engraver creates the following layout object(s):

Section 3.1.126 [VerticalAxisGroup], page 373.

`Hara_kiri_engraver` is part of the following context(s): Section 2.1.2 [ChordNames], page 53, Section 2.1.8 [FiguredBass], page 86, Section 2.1.9 [FretBoards], page 88 and Section 2.1.14 [Lyrics], page 113.

### 2.2.47 Horizontal_bracket_engraver

Create horizontal brackets over notes for musical analysis purposes.

Music types accepted:

Section 1.2.38 [note-grouping-event], page 42

This engraver creates the following layout object(s):

Section 3.1.46 [HorizontalBracket], page 307.

`Horizontal_bracket_engraver` is not part of any context.

### 2.2.48 Hyphen_engraver

Create lyric hyphens and distance constraints between words.

Music types accepted:

Section 1.2.24 [hyphen-event], page 40

This engraver creates the following layout object(s):

Section 3.1.57 [LyricHyphen], page 316 and Section 3.1.58 [LyricSpace], page 317.

`Hyphen_engraver` is part of the following context(s): Section 2.1.14 [Lyrics], page 113.

### 2.2.49 Instrument_name_engraver

Create a system start text for instrument or vocal names.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`instrumentName` (markup)
: The name to print left of a staff. The `instrumentName` property labels the staff in the first system, and the `shortInstrumentName` property labels following lines.

`shortInstrumentName` (markup)
: See `instrumentName`.

`shortVocalName` (markup)
: Name of a vocal line, short version.

`vocalName` (markup)
: Name of a vocal line.

This engraver creates the following layout object(s):

Section 3.1.47 [InstrumentName], page 308.

`Instrument_name_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.9 [FretBoards], page 88, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.14 [Lyrics], page 113, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.18 [PianoStaff], page 138, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.50 Instrument_switch_engraver

Create a cue text for taking instrument.

Properties (read)

`instrumentCueName` (markup)
: The name to print if another instrument is to be taken.

This engraver creates the following layout object(s):

Section 3.1.48 [InstrumentSwitch], page 309.

`Instrument_switch_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.51 Keep_alive_together_engraver

This engraver collects all `Hara_kiri_group_spanner`s that are created in contexts at or below its own. These spanners are then tied together so that one will be removed only if all are removed. For example, if a `StaffGroup` uses this engraver, then the staves in the group will all be visible as long as there is a note in at least one of them.

`Keep_alive_together_engraver` is part of the following context(s): Section 2.1.18 [PianoStaff], page 138.

### 2.2.52 Key_engraver

Engrave a key signature.

Music types accepted:

Section 1.2.25 [key-change-event], page 40

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 changing from a non-natural to another non-natural.

`keyAlterationOrder` (list)
: An alist that defines in what order alterations should be printed. The format is `(`*`step . alter`*`)`, where *step* is a number from 0 to 6 and *alter* from -2 (sharp) to 2 (flat).

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`lastKeySignature` (list)
: Last key signature before a key signature change.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

Properties (write)

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`lastKeySignature` (list)
: Last key signature before a key signature change.

`tonic` (pitch)
: The tonic of the current scale.

This engraver creates the following layout object(s):

Section 3.1.49 [KeyCancellation], page 310 and Section 3.1.50 [KeySignature], page 311.

`Key_engraver` is part of the following context(s): Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.21 [Staff], page 155 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.53 Key_performer

Music types accepted:

Section 1.2.25 [key-change-event], page 40

`Key_performer` is not part of any context.

### 2.2.54 Laissez_vibrer_engraver

Create laissez vibrer items.

Music types accepted:

Section 1.2.27 [laissez-vibrer-event], page 40

This engraver creates the following layout object(s):

Section 3.1.51 [LaissezVibrerTie], page 312 and Section 3.1.52 [LaissezVibrerTieColumn], page 313.

`Laissez_vibrer_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.55 Ledger_line_engraver

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):

Section 3.1.53 [LedgerLineSpanner], page 313.

`Ledger_line_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.56 Ligature_bracket_engraver

Handle `Ligature_events` by engraving `Ligature` brackets.

Music types accepted:

Section 1.2.29 [ligature-event], page 41

This engraver creates the following layout object(s):

Section 3.1.55 [LigatureBracket], page 314.

`Ligature_bracket_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.24 [TabVoice], page 171 and Section 2.1.27 [Voice], page 205.

### 2.2.57 Lyric_engraver

Engrave text for lyrics.

Music types accepted:

Section 1.2.31 [lyric-event], page 41

Properties (read)

`ignoreMelismata` (boolean)
: Ignore melismata for this Section "Lyrics" in *Internals Reference* line.

`includeGraceNotes` (boolean)
: Do not ignore grace notes for Section "Lyrics" in *Internals Reference*.

`lyricMelismaAlignment` (direction)
: Alignment to use for a melisma syllable.

This engraver creates the following layout object(s):

Section 3.1.59 [LyricText], page 317.

`Lyric_engraver` is part of the following context(s): Section 2.1.14 [Lyrics], page 113.

### 2.2.58 Lyric_performer

Music types accepted:

Section 1.2.31 [lyric-event], page 41

`Lyric_performer` is not part of any context.

### 2.2.59 Mark_engraver

Create `RehearsalMark` objects. It puts them on top of all staves (which is taken from the property `stavesFound`). If moving this engraver to a different context, Section 2.2.102 [Staff_collecting_engraver], page 250 must move along, otherwise all marks end up on the same Y location.

Music types accepted:

Section 1.2.32 [mark-event], page 41

Properties (read)

`markFormatter` (procedure)
: A procedure taking as arguments the context and the rehearsal mark. It should return the formatted mark as a markup object.

`rehearsalMark` (integer)
: The last rehearsal mark printed.

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

This engraver creates the following layout object(s):

Section 3.1.81 [RehearsalMark], page 335.

`Mark_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.60 Measure_grouping_engraver

Create `MeasureGrouping` to indicate beat subdivision.

Properties (read)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`beatStructure` (list)
: List of `baseMoments` that are combined to make beats.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`measurePosition` (moment)
: How much of the current measure have we had. This can be set manually to create incomplete measures.

This engraver creates the following layout object(s):

Section 3.1.60 [MeasureGrouping], page 318.

`Measure_grouping_engraver` is not part of any context.

### 2.2.61 Melody_engraver

Create information for context dependent typesetting decisions.

This engraver creates the following layout object(s):

Section 3.1.61 [MelodyItem], page 319.

`Melody_engraver` is not part of any context.

### 2.2.62 Mensural_ligature_engraver

Handle `Mensural_ligature_events` by glueing special ligature heads together.

Music types accepted:

Section 1.2.29 [ligature-event], page 41

This engraver creates the following layout object(s):

Section 3.1.62 [MensuralLigature], page 319.

`Mensural_ligature_engraver` is part of the following context(s): Section 2.1.16 [MensuralVoice], page 125.

### 2.2.63 Metronome_mark_engraver

Engrave metronome marking. This delegates the formatting work to the function in the `metronomeMarkFormatter` property. The mark is put over all staves. The staves are taken from the `stavesFound` property, which is maintained by Section 2.2.102 [Staff_collecting_engraver], page 250.

Properties (read)

`metronomeMarkFormatter` (procedure)
: How to produce a metronome markup. Called with four arguments: text, duration, count and context.

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

`tempoHideNote` (boolean)
: Hide the note=count in tempo marks.

`tempoText` (markup)
: Text for tempo marks.

`tempoUnitCount` (number)
: Count for specifying tempo.

`tempoUnitDuration` (duration)
: Unit for specifying tempo.

This engraver creates the following layout object(s):

Section 3.1.63 [MetronomeMark], page 320.

`Metronome_mark_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.64 Multi_measure_rest_engraver

Engrave multi-measure rests that are produced with '`R`'. It reads `measurePosition` and `internalBarNumber` to determine what number to print over the Section 3.1.64 [MultiMeasureRest], page 321. Reads `measureLength` to determine whether it should use a whole rest or a breve rest to represent one measure.

Music types accepted:

Section 1.2.34 [multi-measure-rest-event], page 41 and Section 1.2.35 [multi-measure-text-event], page 41

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`measureLength` (moment)
: Length of one measure in the current time signature.

`measurePosition` (moment)
: How much of the current measure have we had. This can be set manually to create incomplete measures.

`restNumberThreshold` (number)
: If a multimeasure rest has more measures than this, a number is printed.

This engraver creates the following layout object(s):

Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322 and Section 3.1.66 [MultiMeasureRestText], page 323.

`Multi_measure_rest_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.65 New_dynamic_engraver

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:

Section 1.2.1 [absolute-dynamic-event], page 38 and Section 1.2.57 [span-dynamic-event], page 44

Properties (read)

`crescendoSpanner` (symbol)
: The type of spanner to be used for crescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin crescendo is used.

`crescendoText` (markup)
: The text to print at start of non-hairpin crescendo, i.e., '`cresc.`'.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`decrescendoSpanner` (symbol)
: The type of spanner to be used for decrescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin decrescendo is used.

`decrescendoText` (markup)
: The text to print at start of non-hairpin decrescendo, i.e., '`dim.`'.

This engraver creates the following layout object(s):

Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298 and Section 3.1.44 [Hairpin], page 305.

`New_dynamic_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.7 [Dynamics], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.66 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):

Section 3.1.38 [Fingering], page 300, Section 3.1.87 [Script], page 339, Section 3.1.101 [StringNumber], page 351 and Section 3.1.102 [StrokeFinger], page 352.

`New_fingering_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.67 Note_head_line_engraver

Engrave a line between two note heads, for example a glissando. If `followVoice` is set, staff switches also generate a line.

Properties (read)

`followVoice` (boolean)
: If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s):

Section 3.1.40 [Glissando], page 303 and Section 3.1.127 [VoiceFollower], page 375.

`Note_head_line_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.68 Note_heads_engraver

Generate note heads.

Music types accepted:

Section 1.2.37 [note-event], page 42

Properties (read)

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

`staffLineLayoutFunction` (procedure)
: Layout of staff lines, `traditional`, or `semitone`.

This engraver creates the following layout object(s):

Section 3.1.70 [NoteHead], page 326.

`Note_heads_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.69 Note_name_engraver

Print pitches as words.

Music types accepted:

Section 1.2.37 [note-event], page 42

Properties (read)

`printOctaveNames` (boolean)
: Print octave marks for the `NoteNames` context.

This engraver creates the following layout object(s):

Section 3.1.71 [NoteName], page 327.

`Note_name_engraver` is part of the following context(s): Section 2.1.17 [NoteNames], page 137.

### 2.2.70 Note_performer

Music types accepted:

Section 1.2.37 [note-event], page 42

`Note_performer` is not part of any context.

### 2.2.71 Note_spacing_engraver

Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):

Section 3.1.72 [NoteSpacing], page 327.

`Note_spacing_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.72 Ottava_spanner_engraver

Create a text spanner when the ottavation property changes.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`middleCOffset` (number)
: The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):

Section 3.1.74 [OttavaBracket], page 329.

`Ottava_spanner_engraver` is part of the following context(s): Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.21 [Staff], page 155 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.73 Output_property_engraver

Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.3 [apply-output-event], page 38

`Output_property_engraver` is part of the following context(s): Section 2.1.2 [ChordNames], page 53, Section 2.1.3 [CueVoice], page 54, Section 2.1.5 [DrumStaff], page 67, Section 2.1.6 [DrumVoice], page 72, Section 2.1.7 [Dynamics], page 83, Section 2.1.9 [FretBoards], page 88, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.20 [Score], page 143, Section 2.1.21 [Staff], page 155, Section 2.1.22 [StaffGroup], page 164, Section 2.1.23 [TabStaff], page 165, Section 2.1.24 [TabVoice], page 171, Section 2.1.25 [VaticanaStaff], page 185, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.74 Page_turn_engraver

Decide where page turns are allowed to go.

Music types accepted:

Section 1.2.11 [break-event], page 39

Properties (read)

`minimumPageTurnLength` (moment)
: Minimum length of a rest for a page turn to be allowed.

`minimumRepeatLengthForPageTurn` (moment)
: Minimum length of a repeated section for a page turn to be allowed within that section.

`Page_turn_engraver` is not part of any context.

### 2.2.75 Paper_column_engraver

Take care of generating columns.

This engraver decides whether a column is breakable. The default is that a column is always breakable. However, every `Bar_engraver` that does not have a barline at a certain point will set `forbidBreaks` in the score context to stop line breaks. In practice, this means that you can make a break point by creating a bar line (assuming that there are no beams or notes that prevent a break point).

Music types accepted:

Section 1.2.11 [break-event], page 39 and Section 1.2.26 [label-event], page 40

Properties (read)

`forbidBreak` (boolean)
: If set to `##t`, prevent a line break at this point.

Properties (write)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`forbidBreak` (boolean)
: If set to `##t`, prevent a line break at this point.

This engraver creates the following layout object(s):

Section 3.1.67 [NonMusicalPaperColumn], page 324 and Section 3.1.75 [PaperColumn], page 330.

`Paper_column_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.76 Parenthesis_engraver

Parenthesize objects whose music cause has the `parenthesize` property.

This engraver creates the following layout object(s):

Section 3.1.76 [ParenthesesItem], page 331.

`Parenthesis_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.77 Part_combine_engraver

Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted:

Section 1.2.41 [part-combine-event], page 42

Properties (read)

`aDueText` (markup)
: Text to print at a unisono passage.

`printPartCombineTexts` (boolean)
: Set ‘Solo’ and ‘A due’ texts in the part combiner?

`soloIIText` (markup)
: The text for the start of a solo for voice ‘two’ when part-combining.

`soloText` (markup)
: The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):

Section 3.1.28 [CombineTextScript], page 290.

`Part_combine_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.78 Percent_repeat_engraver

Make whole bar and double bar repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

`countPercentRepeats` (boolean)
: If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`measureLength` (moment)
: Length of one measure in the current time signature.

`repeatCountVisibility` (procedure)
: A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when `countPercentRepeats` is set.

Properties (write)

`forbidBreak` (boolean)
: If set to `##t`, prevent a line break at this point.

This engraver creates the following layout object(s):

Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.77 [PercentRepeat], page 331 and Section 3.1.78 [PercentRepeatCounter], page 332.

`Percent_repeat_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.79 Phrasing_slur_engraver

Print phrasing slurs. Similar to Section 2.2.96 [Slur_engraver], page 249.

Music types accepted:

Section 1.2.46 [phrasing-slur-event], page 43

This engraver creates the following layout object(s):

Section 3.1.79 [PhrasingSlur], page 333.

`Phrasing_slur_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.80 Piano_pedal_align_engraver

Align piano pedal symbols and brackets.

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s):

Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.104 [SustainPedalLineSpanner], page 354 and Section 3.1.123 [UnaCordaPedalLineSpanner], page 372.

`Piano_pedal_align_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.81 Piano_pedal_engraver

Engrave piano pedal symbols and brackets.

Music types accepted:

Section 1.2.55 [sostenuto-event], page 44, Section 1.2.63 [sustain-event], page 46 and Section 1.2.71 [una-corda-event], page 46

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`pedalSostenutoStrings` (list)
: See `pedalSustainStrings`.

`pedalSostenutoStyle` (symbol)
: See `pedalSustainStyle`.

`pedalSustainStrings` (list)
: A list of strings to print for sustain-pedal. Format is `(up updown down)`, where each of the three is the string to print when this is done with the pedal.

`pedalSustainStyle` (symbol)
: A symbol that indicates how to print sustain pedals: `text`, `bracket` or `mixed` (both).

`pedalUnaCordaStrings` (list)
: See `pedalSustainStrings`.

`pedalUnaCordaStyle` (symbol)
: See `pedalSustainStyle`.

This engraver creates the following layout object(s):

Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.103 [SustainPedal], page 353 and Section 3.1.122 [UnaCordaPedal], page 371.

`Piano_pedal_engraver` is part of the following context(s): Section 2.1.7 [Dynamics], page 83, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.82 Piano_pedal_performer

Music types accepted:

Section 1.2.55 [sostenuto-event], page 44, Section 1.2.63 [sustain-event], page 46 and Section 1.2.71 [una-corda-event], page 46

`Piano_pedal_performer` is not part of any context.

### 2.2.83 Pitch_squash_engraver

Set the vertical position of note heads to `squashedPosition`, if that property is set. This can be used to make a single-line staff demonstrating the rhythm of a melody.

Properties (read)

`squashedPosition` (integer)
: Vertical position of squashing for Section "Pitch_squash_engraver" in *Internals Reference*.

`Pitch_squash_engraver` is part of the following context(s): Section 2.1.19 [RhythmicStaff], page 140.

### 2.2.84 Pitched_trill_engraver

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s):

Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366 and Section 3.1.118 [TrillPitchHead], page 367.

`Pitched_trill_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.85 Repeat_acknowledge_engraver

Acknowledge repeated music, and convert the contents of `repeatCommands` into an appropriate setting for `whichBar`.

Properties (read)

`doubleRepeatType` (string)
: Set the default bar line for double repeats.

`repeatCommands` (list)
: This property is a list of commands of the form `(list 'volta` *x*`)`, where *x* is a string or `#f`. `'end-repeat` is also accepted as a command.

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

```
\set Staff.whichBar = "|:"
```

  This will create a start-repeat bar in this staff only. Valid values are described in Section "bar-line-interface" in *Internals Reference*.

`Repeat_acknowledge_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.86 Repeat_tie_engraver

Create repeat ties.

Music types accepted:

Section 1.2.47 [repeat-tie-event], page 43

This engraver creates the following layout object(s):

Section 3.1.83 [RepeatTie], page 337 and Section 3.1.84 [RepeatTieColumn], page 338.

`Repeat_tie_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.87 Rest_collision_engraver

Handle collisions of rests.

Properties (read)

`busyGrobs` (list)
: A queue of `(`*`end-moment . GROB`*`)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s):

Section 3.1.86 [RestCollision], page 339.

`Rest_collision_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.88 Rest_engraver

Engrave rests.

Music types accepted:

Section 1.2.48 [rest-event], page 43

Properties (read)

`middleCPosition` (number)
: The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

This engraver creates the following layout object(s):

Section 3.1.85 [Rest], page 339.

`Rest_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.89 Rhythmic_column_engraver

Generate `NoteColumn`, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s):

Section 3.1.69 [NoteColumn], page 326.

`Rhythmic_column_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.90 Scheme_engraver

Implement engravers in Scheme. Interprets arguments to `\consists` as callbacks.

`Scheme_engraver` is not part of any context.

### 2.2.91 Script_column_engraver

Find potentially colliding scripts and put them into a `ScriptColumn` object; that will fix the collisions.

This engraver creates the following layout object(s):

Section 3.1.88 [ScriptColumn], page 340.

`Script_column_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.92 Script_engraver

Handle note scripted articulations.

Music types accepted:

Section 1.2.5 [articulation-event], page 38

Properties (read)

`scriptDefinitions` (list)
: The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See '`scm/script.scm`' for more information.

This engraver creates the following layout object(s):

Section 3.1.87 [Script], page 339.

`Script_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.7 [Dynamics], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.93 Script_row_engraver

Determine order in horizontal side position elements.

This engraver creates the following layout object(s):

Section 3.1.89 [ScriptRow], page 341.

`Script_row_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.94 Separating_line_group_engraver

Generate objects for computing spacing parameters.

Properties (read)

`createSpacing` (boolean)
: Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

`hasStaffSpacing` (boolean)
: True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s):

Section 3.1.96 [StaffSpacing], page 347.

`Separating_line_group_engraver` is part of the following context(s): Section 2.1.2 [ChordNames], page 53, Section 2.1.5 [DrumStaff], page 67, Section 2.1.8 [FiguredBass], page 86, Section 2.1.9 [FretBoards], page 88, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.17 [NoteNames], page 137, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.95 Slash_repeat_engraver

Make beat repeats.

Music types accepted:

Section 1.2.44 [percent-event], page 43

Properties (read)

`measureLength` (moment)
: Length of one measure in the current time signature.

This engraver creates the following layout object(s):

Section 3.1.82 [RepeatSlash], page 337.

`Slash_repeat_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.96 Slur_engraver

Build slur grobs from slur events.

Music types accepted:

Section 1.2.52 [slur-event], page 44

Properties (read)

`doubleSlurs` (boolean)
: If set, two slurs are created for every slurred note, one above and one below the chord.

`slurMelismaBusy` (boolean)
: Signal if a slur is present.

This engraver creates the following layout object(s):

Section 3.1.90 [Slur], page 341.

`Slur_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.24 [TabVoice], page 171 and Section 2.1.27 [Voice], page 205.

### 2.2.97 Slur_performer

Music types accepted:

Section 1.2.52 [slur-event], page 44

`Slur_performer` is not part of any context.

### 2.2.98 Spacing_engraver

Make a `SpacingSpanner` and do bookkeeping of shortest starting and playing notes.

Music types accepted:

Section 1.2.56 [spacing-section-event], page 44

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`proportionalNotationDuration` (moment)
: Global override for shortest-playing duration. This is used for switching on proportional notation.

This engraver creates the following layout object(s):

Section 3.1.93 [SpacingSpanner], page 344.

`Spacing_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.99 Span_arpeggio_engraver

Make arpeggios that span multiple staves.

Properties (read)

`connectArpeggios` (boolean)
: If set, connect arpeggios across piano staff.

This engraver creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 276.

`Span_arpeggio_engraver` is part of the following context(s): Section 2.1.11 [GrandStaff], page 90, Section 2.1.18 [PianoStaff], page 138 and Section 2.1.22 [StaffGroup], page 164.

### 2.2.100 Span_bar_engraver

Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.

This engraver creates the following layout object(s):

Section 3.1.94 [SpanBar], page 345.

`Span_bar_engraver` is part of the following context(s): Section 2.1.11 [GrandStaff], page 90, Section 2.1.18 [PianoStaff], page 138 and Section 2.1.22 [StaffGroup], page 164.

### 2.2.101 Spanner_break_forbid_engraver

Forbid breaks in certain spanners.

`Spanner_break_forbid_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.102 Staff_collecting_engraver

Maintain the `stavesFound` variable.

Properties (read)

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

Properties (write)

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

`Staff_collecting_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.20 [Score], page 143, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.103 Staff_performer

`Staff_performer` is not part of any context.

### 2.2.104 Staff_symbol_engraver

Create the constellation of five (default) staff lines.

Music types accepted:

Section 1.2.59 [staff-span-event], page 45

This engraver creates the following layout object(s):

Section 3.1.97 [StaffSymbol], page 347.

`Staff_symbol_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155, Section 2.1.23 [TabStaff], page 165 and Section 2.1.25 [VaticanaStaff], page 185.

### 2.2.105 Stanza_number_align_engraver

This engraver ensures that stanza numbers are neatly aligned.

`Stanza_number_align_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.106 Stanza_number_engraver

Engrave stanza numbers.

Properties (read)

`stanza` (markup)
: Stanza 'number' to print before the start of a verse. Use in `Lyrics` context.

This engraver creates the following layout object(s):

Section 3.1.98 [StanzaNumber], page 348.

`Stanza_number_engraver` is part of the following context(s): Section 2.1.14 [Lyrics], page 113.

### 2.2.107 Stem_engraver

Create stems and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:

Section 1.2.67 [tremolo-event], page 46

Properties (read)

`stemLeftBeamCount` (integer)
: Specify the number of beams to draw on the left side of the next note. Overrides automatic beaming. The value is only used once, and then it is erased.

`stemRightBeamCount` (integer)
: See `stemLeftBeamCount`.

`tremoloFlags` (integer)
: The number of tremolo flags to add if no number is specified.

This engraver creates the following layout object(s):

Section 3.1.99 [Stem], page 348 and Section 3.1.100 [StemTremolo], page 350.

`Stem_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171 and Section 2.1.27 [Voice], page 205.

### 2.2.108 System_start_delimiter_engraver

Create a system start delimiter (i.e., a `SystemStartBar`, `SystemStartBrace`, `SystemStartBracket` or `SystemStartSquare` spanner).

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`systemStartDelimiter` (symbol)
: Which grob to make for the start of the system/staff? Set to `SystemStartBrace`, `SystemStartBracket` or `SystemStartBar`.

`systemStartDelimiterHierarchy` (pair)
: A nested list, indicating the nesting of a start delimiters.

This engraver creates the following layout object(s):

Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357 and Section 3.1.109 [SystemStartSquare], page 358.

`System_start_delimiter_engraver` is part of the following context(s): Section 2.1.1 [ChoirStaff], page 52, Section 2.1.11 [GrandStaff], page 90, Section 2.1.18 [PianoStaff], page 138, Section 2.1.20 [Score], page 143 and Section 2.1.22 [StaffGroup], page 164.

### 2.2.109 Tab_harmonic_engraver

In a tablature, parenthesize objects whose music cause has the `parenthesize` property.

This engraver creates the following layout object(s):

Section 3.1.45 [HarmonicParenthesesItem], page 307.

`Tab_harmonic_engraver` is part of the following context(s): Section 2.1.24 [TabVoice], page 171.

### 2.2.110 Tab_note_heads_engraver

Generate one or more tablature note heads from event of type `NoteEvent`.

Music types accepted:

Section 1.2.37 [note-event], page 42 and Section 1.2.61 [string-number-event], page 45

Properties (read)

`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.

`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 pitch (in semitones) of each string (starting with the lower one).

`tablatureFormat` (procedure)
: A function formatting a tablature note head. Called with three arguments: context, string number and, fret number. It returns the text as a markup.

`tabStaffLineLayoutFunction` (procedure)
: A function determining the staff position of a tablature note head. Called with two arguments: the context and the string.

This engraver creates the following layout object(s):

Section 3.1.110 [TabNoteHead], page 358.

`Tab_note_heads_engraver` is part of the following context(s): Section 2.1.24 [TabVoice], page 171.

### 2.2.111 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 pitch (in semitones) of each string (starting with the lower one).

This engraver creates the following layout object(s):

Section 3.1.97 [StaffSymbol], page 347.

`Tab_staff_symbol_engraver` is part of the following context(s): Section 2.1.23 [TabStaff], page 165.

### 2.2.112 Tempo_performer

Properties (read)

`tempoWholesPerMinute` (moment)
: The tempo in whole notes per minute.

`Tempo_performer` is not part of any context.

### 2.2.113 Text_engraver

Create text scripts.

Music types accepted:

Section 1.2.64 [text-script-event], page 46

This engraver creates the following layout object(s):

Section 3.1.111 [TextScript], page 360.

`Text_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.7 [Dynamics], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.114 Text_spanner_engraver

Create text spanner from an event.

Music types accepted:

Section 1.2.65 [text-span-event], page 46

This engraver creates the following layout object(s):

Section 3.1.112 [TextSpanner], page 361.

`Text_spanner_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.7 [Dynamics], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171 and Section 2.1.27 [Voice], page 205.

### 2.2.115 Tie_engraver

Generate ties between note heads of equal pitch.

Music types accepted:

Section 1.2.66 [tie-event], page 46

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.

This engraver creates the following layout object(s):

Section 3.1.113 [Tie], page 362 and Section 3.1.114 [TieColumn], page 364.

`Tie_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.17 [NoteNames], page 137, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.116 Tie_performer

Generate ties between note heads of equal pitch.

Music types accepted:

Section 1.2.66 [tie-event], page 46

Properties (read)

`tieWaitForNote` (boolean)
: If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

`tieMelismaBusy` (boolean)
: Signal whether a tie is present.

`Tie_performer` is not part of any context.

### 2.2.117 Time_signature_engraver

Create a Section 3.1.115 [TimeSignature], page 364 whenever `timeSignatureFraction` changes.

Properties (read)

`implicitTimeSignatureVisibility` (vector)
: break visibility for the default time signature.

`timeSignatureFraction` (pair of numbers)
: A pair of numbers, signifying the time signature. For example, `#'(4 . 4)` is a 4/4 time signature.

This engraver creates the following layout object(s):

Section 3.1.115 [TimeSignature], page 364.

`Time_signature_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 67, Section 2.1.12 [GregorianTranscriptionStaff], page 91, Section 2.1.15 [MensuralStaff], page 115, Section 2.1.19 [RhythmicStaff], page 140, Section 2.1.21 [Staff], page 155 and Section 2.1.23 [TabStaff], page 165.

### 2.2.118 Time_signature_performer

`Time_signature_performer` is not part of any context.

### 2.2.119 Timing_translator

This engraver adds the alias `Timing` to its containing context. Responsible for synchronizing timing information from staves. Normally in `Score`. In order to create polyrhythmic music, this engraver should be removed from `Score` and placed in `Staff`.

Properties (read)

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`measureLength` (moment)
: Length of one measure in the current time signature.

`measurePosition` (moment)
: How much of the current measure have we had. This can be set manually to create incomplete measures.

Properties (write)

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`measureLength` (moment)
: Length of one measure in the current time signature.

`measurePosition` (moment)
: How much of the current measure have we had. This can be set manually to create incomplete measures.

`timeSignatureFraction` (pair of numbers)
: A pair of numbers, signifying the time signature. For example, `#'(4 . 4)` is a 4/4 time signature.

`Timing_translator` is part of the following context(s): Section 2.1.20 [Score], page 143.

### 2.2.120 Translator

Base class. Not instantiated.

`Translator` is not part of any context.

### 2.2.121 Trill_spanner_engraver

Create trill spanner from an event.

Music types accepted:

Section 1.2.69 [trill-span-event], page 46

Properties (read)

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):

Section 3.1.119 [TrillSpanner], page 368.

`Trill_spanner_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.122 Tuplet_engraver

Catch tuplet events and generate appropriate bracket.

Music types accepted:

Section 1.2.70 [tuplet-span-event], page 46

Properties (read)

`tupletFullLength` (boolean)
: If set, the tuplet is printed up to the start of the next note.

`tupletFullLengthNote` (boolean)
: If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

This engraver creates the following layout object(s):

Section 3.1.120 [TupletBracket], page 369 and Section 3.1.121 [TupletNumber], page 370.

`Tuplet_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.123 Tweak_engraver

Read the `tweaks` property from the originating event, and set properties.

`Tweak_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 54, Section 2.1.6 [DrumVoice], page 72, Section 2.1.13 [GregorianTranscriptionVoice], page 100, Section 2.1.16 [MensuralVoice], page 125, Section 2.1.24 [TabVoice], page 171, Section 2.1.26 [VaticanaVoice], page 194 and Section 2.1.27 [Voice], page 205.

### 2.2.124 Vaticana_ligature_engraver

Handle ligatures by glueing special ligature heads together.

Music types accepted:

Section 1.2.29 [ligature-event], page 41 and Section 1.2.45 [pes-or-flexa-event], page 43

This engraver creates the following layout object(s):

Section 3.1.30 [DotColumn], page 292 and Section 3.1.124 [VaticanaLigature], page 373.

`Vaticana_ligature_engraver` is part of the following context(s): Section 2.1.26 [VaticanaVoice], page 194.

### 2.2.125 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.

This engraver creates the following layout object(s):

Section 3.1.125 [VerticalAlignment], page 373.

`Vertical_align_engraver` is part of the following context(s): Section 2.1.1 [ChoirStaff], page 52, Section 2.1.18 [PianoStaff], page 138, Section 2.1.20 [Score], page 143 and Section 2.1.22 [StaffGroup], page 164.

### 2.2.126 Volta_engraver

Make volta brackets.

Properties (read)

`repeatCommands` (list)
: This property is a list of commands of the form `(list 'volta x)`, where *x* is a string or `#f`. `'end-repeat` is also accepted as a command.

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

`voltaSpannerDuration` (moment)
: This specifies the maximum duration to use for the brackets printed for `\alternative`. This can be used to shrink the length of brackets in the situation where one alternative is very large.

This engraver creates the following layout object(s):

Section 3.1.128 [VoltaBracket], page 376 and Section 3.1.129 [VoltaBracketSpanner], page 376.

`Volta_engraver` is part of the following context(s): Section 2.1.20 [Score], page 143.

## 2.3 Tunable context properties

`aDueText` (markup)
: Text to print at a unisono passage.

`alignAboveContext` (string)
: Where to insert newly created context in vertical alignment.

`alignBassFigureAccidentals` (boolean)
: If true, then the accidentals are aligned in bass figure context.

`alignBelowContext` (string)
: Where to insert newly created context in vertical alignment.

`associatedVoice` (string)
: Name of the `Voice` that has the melody for this `Lyrics` line.

`autoAccidentals` (list)
: List of different ways to typeset an accidental.

  For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used.

  Each entry in the list is either a symbol or a procedure.

  *symbol* The symbol is the name of the context in which the following rules are to be applied. For example, if *context* is Section "Score" in *Internals Reference* then all staves share accidentals, and if *context* is Section "Staff" in *Internals Reference* then all voices in the same staff share accidentals, but staves do not.

  *procedure* The procedure represents an accidental rule to be applied to the previously specified context.

  The procedure takes the following arguments:

  `context` The current context to which the rule should be applied.

  `pitch` The pitch of the note to be evaluated.

  `barnum` The current bar number.

  `measurepos`
  : The current measure position.

  The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. `(#t . #f)` does not make sense.

`autoBeamCheck` (procedure)
: A procedure taking three arguments, *context*, *dir* [start/stop (-1 or 1)], and *test* [shortest note in the beam]. A non-`#f` return value starts or stops the auto beam.

`autoBeaming` (boolean)
: If set to true then beams are generated automatically.

`autoCautionaries` (list)
: List similar to `autoAccidentals`, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

`automaticBars` (boolean)
: If set to false then bar lines will not be printed automatically; they must be explicitly created with a `\bar` command. Unlike the `\cadenzaOn` keyword, measures are still counted. Bar line generation will resume according to that count if this property is unset.

`barAlways` (boolean)
: If set to true a bar line is drawn after each note.

`barCheckSynchronize` (boolean)
: If true then reset `measurePosition` when finding a bar check.

`barNumberVisibility` (procedure)
: A Procedure that takes an integer and returns whether the corresponding bar number should be printed.

`baseMoment` (moment)
: Smallest unit of time that will stand on its own as a subdivided section.

`bassFigureFormatFunction` (procedure)
: A procedure that is called to produce the formatting for a `BassFigure` grob. It takes a list of `BassFigureEvent`s, a context, and the grob to format.

`bassStaffProperties` (list)
: An alist of property settings to apply for the down staff of `PianoStaff`. Used by `\autochange`.

`beamExceptions` (list)
: An alist of exceptions to autobeam rules that normally end on beats.

`beatStructure` (list)
: List of `baseMoment`s that are combined to make beats.

`chordChanges` (boolean)
: Only show changes in chords scheme?

`chordNameExceptions` (list)
: An alist of chord exceptions. Contains `(`*`chord . markup`*`)` entries.

`chordNameExceptionsFull` (list)
: An alist of full chord exceptions. Contains `(`*`chord . markup`*`)` entries.

`chordNameExceptionsPartial` (list)
: An alist of partial chord exceptions. Contains `(`*`chord . (prefix-markup suffix-markup`*`))` entries.

`chordNameFunction` (procedure)
: The function that converts lists of pitches to chord names.

`chordNameLowercaseMinor` (boolean)
: Downcase roots of minor chords?

`chordNameSeparator` (markup)
: The markup object used to separate parts of a chord name.

`chordNoteNamer` (procedure)
: A function that converts from a pitch object to a text markup. Used for single pitches.

`chordPrefixSpacer` (number)
: The space added between the root symbol and the prefix of a chord name.

`chordRootNamer` (procedure)
: A function that converts from a pitch object to a text markup. Used for chords.

`clefGlyph` (string)
: Name of the symbol within the music font.

`clefOctavation` (integer)
: Add this much extra octavation. Values of 7 and -7 are common.

`clefPosition` (number)
: Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`completionBusy` (boolean)
: Whether a completion-note head is playing.

`connectArpeggios` (boolean)
: If set, connect arpeggios across piano staff.

`countPercentRepeats` (boolean)
: If set, produce counters for percent repeats.

`createKeyOnClefChange` (boolean)
: Print a key signature whenever the clef is changed.

`createSpacing` (boolean)
: Create `StaffSpacing` objects? Should be set for staves.

`crescendoSpanner` (symbol)
: The type of spanner to be used for crescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin crescendo is used.

`crescendoText` (markup)
: The text to print at start of non-hairpin crescendo, i.e., '`cresc.`'.

`currentBarNumber` (integer)
: Contains the current barnumber. This property is incremented at every bar line.

`decrescendoSpanner` (symbol)
: The type of spanner to be used for decrescendi. Available values are '`hairpin`' and '`text`'. If unset, a hairpin decrescendo is used.

`decrescendoText` (markup)
: The text to print at start of non-hairpin decrescendo, i.e., '`dim.`'.

`defaultBarType` (string)
: Set the default type of bar line. See `whichBar` for information on available bar types.

  This variable is read by Section "Timing_translator" in *Internals Reference* at Section "Score" in *Internals Reference* level.

`doubleRepeatType` (string)
: Set the default bar line for double repeats.

`doubleSlurs` (boolean)
: If set, two slurs are created for every slurred note, one above and one below the chord.

`drumPitchTable` (hash table)
: A table mapping percussion instruments (symbols) to pitches.

`drumStyleTable` (hash table)
: A hash table which maps drums to layout settings. Predefined values: '`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.

`explicitClefVisibility` (vector)
: '`break-visibility`' function for 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 changing from a non-natural to another non-natural.

`figuredBassAlterationDirection` (direction)
: Where to put alterations relative to the main figure.

`figuredBassCenterContinuations` (boolean)
: Whether to vertically center pairs of extender lines. This does not work with three or more lines.

`figuredBassFormatter` (procedure)
: A routine generating a markup for a bass figure.

`figuredBassPlusDirection` (direction)
: Where to put plus signs relative to the main figure.

`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.

`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.

`gridInterval` (moment)
: Interval for which to generate `GridPoint`s.

`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.

`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.

`implicitTimeSignatureVisibility` (vector)
: break visibility for the default time signature.

`includeGraceNotes` (boolean)
: Do not ignore grace notes for Section "Lyrics" in *Internals Reference*.

`instrumentCueName` (markup)
: The name to print if another instrument is to be taken.

`instrumentEqualizer` (procedure)
: A function taking a string (instrument name), and returning a `(`*`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 like middle C. This is used to transpose the MIDI output, and `\quote`s.

`internalBarNumber` (integer)
: Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`keepAliveInterfaces` (list)
: A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

`keyAlterationOrder` (list)
: An alist that defines in what order alterations should be printed. The format is `(step . alter)`, where *step* is a number from 0 to 6 and *alter* from -2 (sharp) to 2 (flat).

`keySignature` (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. `keySignature = #`((6 . ,FLAT))`.

`lyricMelismaAlignment` (direction)
: Alignment to use for a melisma syllable.

`majorSevenSymbol` (markup)
: How should the major 7th be formatted in a chord name?

`markFormatter` (procedure)
: A procedure taking as arguments the context and the rehearsal mark. It should return the formatted mark as a markup object.

`maximumFretStretch` (number)
: Don't allocate frets further than this from specified frets.

`measureLength` (moment)
: Length of one measure in the current time signature.

`measurePosition` (moment)
: How much of the current measure have we had. This can be set manually to create incomplete measures.

`melismaBusyProperties` (list)
: A list of properties (symbols) to determine whether a melisma is playing. Setting this property will influence how lyrics are aligned to notes. For example, if set to `#'(melismaBusy beamMelismaBusy)`, only manual melismata and manual beams are considered. Possible values include `melismaBusy`, `slurMelismaBusy`, `tieMelismaBusy`, and `beamMelismaBusy`.

`metronomeMarkFormatter` (procedure)
: How to produce a metronome markup. Called with four arguments: text, duration, count 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`.

`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`.

`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.

`minimumFret` (number)
: The tablature auto string-selecting mechanism selects the highest string with a fret at least `minimumFret`.

`minimumPageTurnLength` (moment)
: Minimum length of a rest for a page turn to be allowed.

`minimumRepeatLengthForPageTurn` (moment)
: Minimum length of a repeated section for a page turn to be allowed within that section.

`noChordSymbol` (markup)
: Markup to be displayed for rests in a ChordNames context.

`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.

`ottavation` (markup)
: If set, the text for an ottava spanner. Changing this creates a new text spanner.

`output` (music output)
: The output produced by a score-level translator during music interpretation.

`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.

`printKeyCancellation` (boolean)
: Print restoration alterations before a key signature change.

`printOctaveNames` (boolean)
: Print octave marks for the `NoteNames` context.

`printPartCombineTexts` (boolean)
: Set ‘Solo’ and ‘A due’ texts in the part combiner?

`proportionalNotationDuration` (moment)
: Global override for shortest-playing duration. This is used for switching on proportional notation.

`rehearsalMark` (integer)
: The last rehearsal mark printed.

`repeatCommands` (list)
: This property is a list of commands of the form `(list 'volta x)`, where $x$ is a string or `#f`. `'end-repeat` is also accepted as a command.

`repeatCountVisibility` (procedure)
: A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when `countPercentRepeats` is set.

`restNumberThreshold` (number)
: If a multimeasure rest has more measures than this, a number is printed.

`shapeNoteStyles` (vector)
: Vector of symbols, listing style for each note head relative to the tonic (qv.) of the scale.

`shortInstrumentName` (markup)
: See `instrumentName`.

`shortVocalName` (markup)
: Name of a vocal line, short version.

`skipBars` (boolean)
: If set to true, then skip the empty bars that are produced by multimeasure notes and rests. These bars will not appear on the printed output. If not set (the default), multimeasure notes and rests expand into their full length, printing the appropriate number of empty bars so that synchronization with other voices is preserved.

```
{
  r1 r1*3 R1*3
  \set Score.skipBars= ##t
  r1*3 R1*3
}
```

`skipTypesetting` (boolean)
: If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

`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.

`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`.

`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 pitch (in semitones) of each string (starting with the lower one).

`strokeFingerOrientations` (list)
: See `fingeringOrientations`.

`subdivideBeams` (boolean)
: If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

`suggestAccidentals` (boolean)
: If set, accidentals are typeset as cautionary suggestions over the note.

`systemStartDelimiter` (symbol)
: Which grob to make for the start of the system/staff? Set to `SystemStartBrace`, `SystemStartBracket` or `SystemStartBar`.

`systemStartDelimiterHierarchy` (pair)
: A nested list, indicating the nesting of a start delimiters.

`tablatureFormat` (procedure)
: A function formatting a tablature note head. Called with three arguments: context, string number and, fret number. It returns the text as a markup.

`tabStaffLineLayoutFunction` (procedure)
: A function determining the staff position of a tablature note head. Called with two arguments: the context and the string.

`tempoHideNote` (boolean)
: Hide the note=count in tempo marks.

`tempoText` (markup)
: Text for tempo marks.

`tempoUnitCount` (number)
: Count for specifying tempo.

`tempoUnitDuration` (duration)
: Unit for specifying tempo.

`tempoWholesPerMinute` (moment)
: The tempo in whole notes per minute.

`tieWaitForNote` (boolean)
: If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

`timeSignatureFraction` (pair of numbers)
: A pair of numbers, signifying the time signature. For example, `#'(4 . 4)` is a 4/4 time signature.

`timeSignatureSettings` (list)
: A nested alist of settings for time signatures. Contains elements for various time signatures. The element for each time signature contains entries for `baseMoment`, `beatStructure`, and `beamExceptions`.

`timing` (boolean)
: Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

`tonic` (pitch)
: The tonic of the current scale.

`topLevelAlignment` (boolean)
: If true, the *Vertical_align_engraver* will create a *VerticalAlignment*; otherwise, it will create a *StaffGrouper*

`trebleStaffProperties` (list)
: An alist of property settings to apply for the up staff of `PianoStaff`. Used by `\autochange`.

`tremoloFlags` (integer)
: The number of tremolo flags to add if no number is specified.

`tupletFullLength` (boolean)
: If set, the tuplet is printed up to the start of the next note.

`tupletFullLengthNote` (boolean)
: If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

`tupletSpannerDuration` (moment)
: Normally, a tuplet bracket is as wide as the `\times` expression that gave rise to it. By setting this property, you can make brackets last shorter.

```
{
  \set tupletSpannerDuration = #(ly:make-moment 1 4)
  \times 2/3 { c8 c c c c c }
}
```

`useBassFigureExtenders` (boolean)
: Whether to use extender lines for repeated bass figures.

`vocalName` (markup)
: Name of a vocal line.

`voltaSpannerDuration` (moment)
: This specifies the maximum duration to use for the brackets printed for `\alternative`. This can be used to shrink the length of brackets in the situation where one alternative is very large.

`whichBar` (string)
: This property is read to determine what type of bar line to create.

  Example:

```
\set Staff.whichBar = "|:"
```

  This will create a start-repeat bar in this staff only. Valid values are described in Section “bar-line-interface” in *Internals Reference*.

## 2.4 Internal context properties

`associatedVoiceContext` (context)
: The context object of the `Voice` that has the melody for this `Lyrics`.

`barCheckLastFail` (moment)
: Where in the measure did the last barcheck fail?

`beamMelismaBusy` (boolean)
: Signal if a beam is present.

`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.).

`currentCommandColumn` (graphical (layout) object)
: Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`currentMusicalColumn` (graphical (layout) object)
: Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`dynamicAbsoluteVolumeFunction` (procedure)
: A procedure that takes one argument, the text value of a dynamic event, and returns the absolute volume of that dynamic event.

`finalizations` (list)
: A list of expressions to evaluate before proceeding to next time step. This is an internal variable.

`graceSettings` (list)
: Overrides for grace notes. This property should be manipulated through the `add-grace-property` function.

`hasStaffSpacing` (boolean)
: True if the current `CommandColumn` contains items that will affect spacing.

`lastKeySignature` (list)
: Last key signature before a key signature change.

`localKeySignature` (list)
: The key signature at this point in the measure. The format is the same as for `keySignature`, but can also contain `((`*`octave . name`*`) . (`*`alter barnumber . measureposition`*`))` pairs.

`melismaBusy` (boolean)
: Signifies whether a melisma is active. This can be used to signal melismas on top of those automatically detected.

`quotedCueEventTypes` (list)
: A list of symbols, representing the event types that should be duplicated for `\cueDuring` commands.

`quotedEventTypes` (list)
: A list of symbols, representing the event types that should be duplicated for `\quoteDuring` commands. This is also a fallback for `\cueDuring` if `quotedCueEventTypes` is not set

`rootSystem` (graphical (layout) object)
: The System object.

`scriptDefinitions` (list)
: The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See '`scm/script.scm`' for more information.

`slurMelismaBusy` (boolean)
: Signal if a slur is present.

`stavesFound` (list of grobs)
: A list of all staff-symbols found.

`tieMelismaBusy` (boolean)
: Signal whether a tie is present.

# 3 Backend

## 3.1 All layout objects

### 3.1.1 Accidental

Accidental objects are created by: Section 2.2.1 [Accidental_engraver], page 217.

Standard settings:

`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`.

`glyph-name-alist` (list):
`'((0 . accidentals.natural) (-1/2 . accidentals.flat) (1/2 . accidentals.sharp) (1 . accidentals.doublesharp) (-1 . accidentals.flatflat) (3/4 . accidentals.sharp.slashslash.stemstemstem) (1/4 . accidentals.sharp.slashslash.stem) (-1/4 . accidentals.mirroredflat) (-3/4 . accidentals.mirroredflat.flat))`
An alist of key-string pairs.

`stencil` (stencil):
`ly:accidental-interface::print`
The symbol to print.

`X-extent` (pair of numbers):
`ly:accidental-interface::width`
Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:accidental-interface::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.1 [accidental-interface], page 378, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.2 AccidentalCautionary

AccidentalCautionary objects are created by: Section 2.2.1 [Accidental_engraver], page 217.

Standard settings:

`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`.

`glyph-name-alist` (list):
`'((0 . accidentals.natural) (-1/2 . accidentals.flat) (1/2 . accidentals.sharp) (1 . accidentals.doublesharp) (-1 . accidentals.flatflat) (3/4 . accidentals.sharp.slashslash.stemstemstem) (1/4 . accidentals.sharp.slashslash.stem) (-1/4 . accidentals.mirroredflat) (-3/4 . accidentals.mirroredflat.flat))`

An alist of key-string pairs.

`parenthesized` (boolean):
`#t`

Parenthesize this grob.

`stencil` (stencil):
`ly:accidental-interface::print`

The symbol to print.

`Y-extent` (pair of numbers):
`ly:accidental-interface::height`

Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.1 [accidental-interface], page 378, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.3 AccidentalPlacement

AccidentalPlacement objects are created by: Section 2.2.1 [Accidental_engraver], page 217 and Section 2.2.2 [Ambitus_engraver], page 219.

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 sorting key that determines in what order a script is within a stack of scripts.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Hard coded extent in X direction.

This object supports the following interface(s): Section 3.2.2 [accidental-placement-interface], page 378, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.4 AccidentalSuggestion

AccidentalSuggestion objects are created by: Section 2.2.1 [Accidental_engraver], page 217.

Standard settings:

`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. Fractional values are allowed.

`glyph-name-alist` (list):
```
'((0 . accidentals.natural) (-1/2 . accidentals.flat) (1/2
. accidentals.sharp) (1 . accidentals.doublesharp) (-1 .
accidentals.flatflat) (3/4 . accidentals.sharp.slashslash.stemstemstem)
(1/4 . accidentals.sharp.slashslash.stem)
(-1/4 . accidentals.mirroredflat) (-3/4 .
accidentals.mirroredflat.flat))
```

An alist of key-string pairs.

`outside-staff-priority` (number):
`0`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`script-priority` (number):
`0`

A sorting key that determines in what order a script is within a stack of scripts.

`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.

`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-extent` (pair of numbers):
`ly:accidental-interface::width`

Hard coded extent in X direction.

`X-offset` (number):
`#<simple-closure (#<primitive-generic +> #<simple-closure (#<primitive-procedure ly:self-alignment-interface::centered-on-x-parent>) > #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-aligned-on-self>) >) >`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`ly:accidental-interface::height`

Hard coded extent in Y direction.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.1 [accidental-interface], page 378, Section 3.2.3 [accidental-suggestion-interface], page 379, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.84 [script-interface], page 420, Section 3.2.85 [self-alignment-interface], page 421 and Section 3.2.89 [side-position-interface], page 423.

### 3.1.5 Ambitus

Ambitus objects are created by: Section 2.2.2 [Ambitus_engraver], page 219.

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 and spacing breakable items.

`break-visibility` (vector):
`#(#f #f #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):
`'((clef extra-space . 0.5) (key-signature extra-space . 0.0) (staff-bar extra-space . 0.0) (time-signature extra-space . 0.0) (first-note fixed-space . 0.0))`

A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(`*`break-align-symbol type . distance`*`)`, where *type* can be the symbols `minimum-space` or `extra-space`.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`

Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.5 [ambitus-interface], page 380, Section 3.2.7 [axis-group-interface], page 380, Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.6 AmbitusAccidental

AmbitusAccidental objects are created by: Section 2.2.2 [Ambitus_engraver], page 219.

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`.

`glyph-name-alist` (list):
`'((0 . accidentals.natural) (-1/2 . accidentals.flat) (1/2 . accidentals.sharp) (1 . accidentals.doublesharp) (-1 . accidentals.flatflat) (3/4 . accidentals.sharp.slashslash.stemstemstem) (1/4 . accidentals.sharp.slashslash.stem) (-1/4 . accidentals.mirroredflat) (-3/4 . accidentals.mirroredflat.flat))`

An alist of key-string pairs.

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`side-axis` (number):
`0`

If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`stencil` (stencil):
`ly:accidental-interface::print`

The symbol to print.

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`ly:accidental-interface::height`

Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.1 [accidental-interface], page 378, Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.89 [side-position-interface], page 423.

### 3.1.7 AmbitusLine

AmbitusLine objects are created by: Section 2.2.2 [Ambitus_engraver], page 219.

Standard settings:

`gap` (dimension, in staff space):
`0.35`

Size of a gap in a variable symbol.

`stencil` (stencil):
`ambitus::print`

The symbol to print.

`thickness` (number):
`2`

Line thickness, generally measured in `line-thickness`.

`X-offset` (number):
`ly:self-alignment-interface::centered-on-x-parent`

The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.5 [ambitus-interface], page 380, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.8 AmbitusNoteHead

AmbitusNoteHead objects are created by: Section 2.2.2 [Ambitus_engraver], page 219.

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.

`stencil` (stencil):
`ly:note-head::print`
The symbol to print.

`Y-offset` (number):
`ly:staff-symbol-referencer::callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.5 [ambitus-interface], page 380, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.48 [ledgered-interface], page 407, Section 3.2.66 [note-head-interface], page 413, Section 3.2.82 [rhythmic-head-interface], page 419 and Section 3.2.100 [staff-symbol-referencer-interface], page 431.

### 3.1.9 Arpeggio

Arpeggio objects are created by: Section 2.2.3 [Arpeggio_engraver], page 219 and Section 2.2.99 [Span_arpeggio_engraver], page 250.

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):
`0.5`
Add this much extra space between objects that are next to each other.

`positions` (pair of numbers):
`ly:arpeggio::calc-positions`
Pair of staff coordinates `(`*`left . right`*`)`, where both *left* and *right* are in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`script-priority` (number):
`0`
A sorting key that determines in what order a script is within a stack of scripts.

`side-axis` (number):
`0`
If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`staff-position` (number):
`0.0`
Vertical position, measured in half staff spaces, counted from the middle line.

`stencil` (stencil):
`ly:arpeggio::print`
The symbol to print.

`X-extent` (pair of numbers):
`ly:arpeggio::width`
Hard coded extent in X direction.

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`
The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:staff-symbol-referencer::callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.6 [arpeggio-interface], page 380, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.100 [staff-symbol-referencer-interface], page 431.

### 3.1.10 BalloonTextItem

BalloonTextItem objects are created by: Section 2.2.6 [Balloon_engraver], page 220.

Standard settings:

`stencil` (stencil):
`ly:balloon-interface::print`
The symbol to print.

`text` (markup):
`#<procedure #f (grob)>`
Text markup. See Section "Formatting text" in *Notation Reference*.

`X-offset` (number):
`#<procedure #f (grob)>`
The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`#<procedure #f (grob)>`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.8 [balloon-interface], page 383, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.110 [text-interface], page 436.

### 3.1.11 BarLine

BarLine objects are created by: Section 2.2.7 [Bar_engraver], page 220.

Standard settings:

`allow-span-bar` (boolean):
`#t`

If false, no inter-staff bar line will be created below this bar line.

`bar-size` (dimension, in staff space):
`ly:bar-line::calc-bar-size`

The size of a bar line.

`break-align-anchor` (number):
`ly:bar-line::calc-anchor`

Grobs aligned to this break-align grob 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 and spacing breakable items.

`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.

`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.

`glyph-name` (string):
`bar-line::calc-glyph-name`

The glyph name within the font.

`hair-thickness` (number):
`1.9`

Thickness of the thin line in a bar line.

`kern` (dimension, in staff space):
`3.0`

Amount of extra white space to add. For bar lines, this is the amount of space after a thick line.

`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`.

`space-alist` (list):
: `'((time-signature extra-space . 0.75) (custos minimum-space . 2.0) (clef minimum-space . 1.0) (key-signature extra-space . 1.0) (key-cancellation extra-space . 1.0) (first-note fixed-space . 1.3) (next-note semi-fixed-space . 0.9) (right-edge extra-space . 0.0))`

A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(`*`break-align-symbol type . distance`*`)`, where *type* can be the symbols `minimum-space` or `extra-space`.

`stencil` (stencil):
: `ly:bar-line::print`

The symbol to print.

`thick-thickness` (number):
: `6.0`

Bar line thickness, measured in `line-thickness`.

`thin-kern` (number):
: `3.0`

The space after a hair-line in a bar line.

This object supports the following interface(s): Section 3.2.9 [bar-line-interface], page 383, Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.12 BarNumber

BarNumber objects are created by: Section 2.2.8 [Bar_number_engraver], page 221.

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 symbols that determine which break-aligned grobs 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 `left-edge`, `ambitus`, `breathing-sign`, `clef`, `staff-bar`, `key-cancellation`, `key-signature`, `time-signature`, and `custos`.

`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`.

`font-family` (symbol):
`'roman`

The font family is the broadest category for selecting text fonts. Options include: `sans`, `roman`.

`font-size` (number):
`-2`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`outside-staff-priority` (number):
`100`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`padding` (dimension, in staff space):
`1.0`

Add this much extra space between objects that are next to each other.

`self-alignment-X` (number):
`1`

Specify alignment of an object. The value `-1` means left aligned, `0` centered, and `1` right-aligned in X direction. Other numerical values may also be specified.

`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):
`#<simple-closure (#<primitive-generic +> #<simple-closure (#<primitive-procedure ly:break-alignable-interface::self-align-callback>) > #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-aligned-on-self>) >) >`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.14 [break-alignable-interface], page 387, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.110 [text-interface], page 436.

### 3.1.13 BassFigure

BassFigure objects are created by: Section 2.2.33 [Figured_bass_engraver], page 229.

Standard settings:

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

This object supports the following interface(s): Section 3.2.11 [bass-figure-interface], page 384, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.81 [rhythmic-grob-interface], page 419 and Section 3.2.110 [text-interface], page 436.

### 3.1.14 BassFigureAlignment

BassFigureAlignment objects are created by: Section 2.2.33 [Figured_bass_engraver], page 229.

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):
`0.2`
Add this much extra space between objects that are next to each other.

`stacking-dir` (direction):
`-1`
Stack objects in which direction?

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.4 [align-interface], page 379, Section 3.2.7 [axis-group-interface], page 380, Section 3.2.10 [bass-figure-alignment-interface], page 384, Section 3.2.39 [grob-interface], page 397 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.15 BassFigureAlignmentPositioning

BassFigureAlignmentPositioning objects are created by: Section 2.2.34 [Figured_bass_position_engraver], page 229.

Standard settings:

`axes` (list):
`'(1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction` (direction):
`1`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or

`#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`side-axis` (number):
`1`

If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`staff-padding` (dimension, in staff space):
`1.0`

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`

Hard coded extent in Y direction.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.39 [grob-interface], page 397, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.16 BassFigureBracket

BassFigureBracket objects are created by: Section 2.2.33 [Figured_bass_engraver], page 229.

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`

Hard coded extent in X direction.

This object supports the following interface(s): Section 3.2.29 [enclosing-bracket-interface], page 392, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.17 BassFigureContinuation

BassFigureContinuation objects are created by: Section 2.2.33 [Figured_bass_engraver], page 229.

Standard settings:

`stencil` (stencil):
`ly:figured-bass-continuation::print`
The symbol to print.

`Y-offset` (number):
`ly:figured-bass-continuation::center-on-figures`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.31 [figured-bass-continuation-interface], page 393, Section 3.2.39 [grob-interface], page 397 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.18 BassFigureLine

BassFigureLine objects are created by: Section 2.2.33 [Figured_bass_engraver], page 229.

Standard settings:

`axes` (list):
`'(1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`vertical-skylines` (pair of skylines):
`ly:axis-group-interface::calc-skylines`
Two skylines, one above and one below this grob.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.39 [grob-interface], page 397 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.19 Beam

Beam objects are created by: Section 2.2.4 [Auto_beam_engraver], page 219, Section 2.2.9 [Beam_engraver], page 221, Section 2.2.15 [Chord_tremolo_engraver], page 223 and Section 2.2.40 [Grace_beam_engraver], page 231.

Standard settings:

`auto-knee-gap` (dimension, in staff space):
`5.5`
If a gap is found between note heads where a horizontal beam fits that 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?

`concaveness` (number):
`ly:beam::calc-concaveness`
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):
`1`
Amount of beam slope damping.

`details` (list):
`'((secondary-beam-demerit . 10) (stem-length-demerit-factor . 5) (region-size . 2) (beam-eps . 0.001) (stem-length-limit-penalty . 5000) (damping-direction-penalty . 800) (hint-direction-penalty . 20) (musical-direction-factor . 400) (ideal-slope-factor . 10) (round-to-zero-slope . 0.02))`
Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction):
`ly:beam::calc-direction`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`font-family` (symbol):
`'roman`
The font family is the broadest category for selecting text fonts. Options include: `sans`, `roman`.

`gap` (dimension, in staff space):
`0.8`
Size of a gap in a variable symbol.

`neutral-direction` (direction):
`-1`
Which direction to take in the center of the staff.

`positions` (pair of numbers):
`#<simple-closure #<simple-closure (#<procedure chain-grob-member-functions (grob value . funcs)> (#<primitive-procedure cons> 0 0) #<primitive-procedure ly:beam::calc-least-squares-positions> #<primitive-procedure ly:beam::slope-damping> #<primitive-procedure`

`ly:beam::shift-region-to-valid> #<primitive-procedure ly:beam::quanting>) > >`

Pair of staff coordinates `(left . right)`, where both *left* and *right* are in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`stencil` (stencil):
`ly:beam::print`

The symbol to print.

This object supports the following interface(s): Section 3.2.12 [beam-interface], page 384, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.96 [spanner-interface], page 429, Section 3.2.100 [staff-symbol-referencer-interface], page 431 and Section 3.2.119 [unbreakable-spanner-interface], page 442.

### 3.1.20 BendAfter

BendAfter objects are created by: Section 2.2.11 [Bend_engraver], page 222.

Standard settings:

`minimum-length` (dimension, in staff space):
`0.5`

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`stencil` (stencil):
`bend::print`

The symbol to print.

`thickness` (number):
`2.0`

Line thickness, generally measured in `line-thickness`.

This object supports the following interface(s): Section 3.2.13 [bend-after-interface], page 387, Section 3.2.39 [grob-interface], page 397 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.21 BreakAlignGroup

BreakAlignGroup objects are created by: Section 2.2.12 [Break_align_engraver], page 222.

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 break-align grob 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-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`

  Hard coded extent in X direction.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.22 BreakAlignment

BreakAlignment objects are created by: Section 2.2.12 [Break_align_engraver], page 222.

Standard settings:

`axes` (list):
: `'(0)`

  List of axis numbers. In the case of alignment grobs, this should contain only one number.

`break-align-orders` (vector):
: `#((left-edge ambitus breathing-sign clef staff-bar key-cancellation key-signature time-signature custos) (left-edge ambitus breathing-sign clef staff-bar key-cancellation key-signature time-signature custos) (left-edge ambitus breathing-sign clef key-cancellation key-signature staff-bar time-signature custos))`

  Defines the order in which prefatory matter (clefs, key signatures) appears. The format is a vector of length 3, where each element is one order for end-of-line, middle of line, and start-of-line, respectively. An order is a list of symbols.

  For example, clefs are put after key signatures by setting

```
\override Score.BreakAlignment #'break-align-orders =
  #(make-vector 3 '(span-bar
                    breathing-sign
                    staff-bar
                    key
                    clef
                    time-signature))
```

`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`

  Hard coded extent in X direction.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.16 [break-alignment-interface], page 388, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.23 BreathingSign

BreathingSign objects are created by: Section 2.2.13 [Breathing_sign_engraver], page 223.

Standard settings:

`break-align-symbol` (symbol):
`'breathing-sign`

This key is used for aligning and spacing breakable items.

`break-visibility` (vector):
`#(#t #t #f)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):
`'((ambitus extra-space . 2.0) (custos minimum-space . 1.0) (key-signature minimum-space . 1.5) (time-signature minimum-space . 1.5) (staff-bar minimum-space . 1.5) (clef minimum-space . 2.0) (first-note fixed-space . 1.0) (right-edge extra-space . 0.1))`

A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(`*`break-align-symbol type . distance`*`)`, where *type* can be the symbols `minimum-space` or `extra-space`.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`text` (markup):
`'(#<procedure musicglyph-markup (layout props glyph-name)> scripts.rcomma)`

Text markup. See Section “Formatting text” in *Notation Reference*.

`Y-offset` (number):
`ly:breathing-sign::offset-callback`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.17 [breathing-sign-interface], page 389, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.110 [text-interface], page 436.

### 3.1.24 ChordName

ChordName objects are created by: Section 2.2.14 [Chord_name_engraver], page 223.

Standard settings:

`after-line-breaking` (boolean):
`ly:chord-name::after-line-breaking`
Dummy property, used to trigger callback for `after-line-breaking`.

`font-family` (symbol):
`'sans`
The font family is the broadest category for selecting text fonts. Options include: `sans`, `roman`.

`font-size` (number):
`1.5`
The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. 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.

This object supports the following interface(s): Section 3.2.18 [chord-name-interface], page 389, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.81 [rhythmic-grob-interface], page 419 and Section 3.2.110 [text-interface], page 436.

### 3.1.25 Clef

Clef objects are created by: Section 2.2.16 [Clef_engraver], page 224.

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 break-align grob 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):
`'clef`
This key is used for aligning and spacing breakable items.

`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):
`'(-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)`.

`glyph-name` (string):
`ly:clef::calc-glyph-name`

The glyph name within the font.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):
`'((ambitus extra-space . 2.0) (staff-bar extra-space . 0.7) (key-cancellation minimum-space . 3.5) (key-signature minimum-space . 3.5) (time-signature minimum-space . 4.2) (first-note minimum-fixed-space . 5.0) (next-note extra-space . 0.5) (right-edge extra-space . 0.5))`

A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(`*`break-align-symbol type . distance`*`)`, where *type* can be the symbols `minimum-space` or `extra-space`.

`stencil` (stencil):
`ly:clef::print`

The symbol to print.

`Y-offset` (number):
`ly:staff-symbol-referencer::callback`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.19 [clef-interface], page 389, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.100 [staff-symbol-referencer-interface], page 431.

### 3.1.26 ClusterSpanner

ClusterSpanner objects are created by: Section 2.2.17 [Cluster_spanner_engraver], page 224.

Standard settings:

`minimum-length` (dimension, in staff space):
`0.0`

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`padding` (dimension, in staff space):
`0.25`

Add this much extra space between objects that are next to each other.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`
Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:cluster::print`
The symbol to print.

`style` (symbol):
`'ramp`
This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

This object supports the following interface(s): Section 3.2.21 [cluster-interface], page 390, Section 3.2.39 [grob-interface], page 397 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.27 ClusterSpannerBeacon

ClusterSpannerBeacon objects are created by: Section 2.2.17 [Cluster_spanner_engraver], page 224.

Standard settings:

`Y-extent` (pair of numbers):
`ly:cluster-beacon::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.20 [cluster-beacon-interface], page 389, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.81 [rhythmic-grob-interface], page 419.

### 3.1.28 CombineTextScript

CombineTextScript objects are created by: Section 2.2.77 [Part_combine_engraver], page 243.

Standard settings:

`avoid-slur` (symbol):
`'outside`
Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

`baseline-skip` (dimension, in staff space):
`2`
Distance between base lines of multiple lines of text.

`direction` (direction):
`1`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`

In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

`font-series` (symbol):
`'bold`

Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`outside-staff-priority` (number):
`450`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`script-priority` (number):
`200`

A sorting key that determines in what order a script is within a stack of scripts.

`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::x-aligned-on-self`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.89 [side-position-interface], page 423, Section 3.2.110 [text-interface], page 436 and Section 3.2.111 [text-script-interface], page 437.

### 3.1.29 Custos

Custos objects are created by: Section 2.2.21 [Custos_engraver], page 225.

Standard settings:

`break-align-symbol` (symbol):
`'custos`
This key is used for aligning and spacing breakable items.

`break-visibility` (vector):
`#(#t #f #f)`
A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`neutral-direction` (direction):
`-1`
Which direction to take in the center of the staff.

`non-musical` (boolean):
`#t`
True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):
`'((first-note minimum-fixed-space . 0.0) (right-edge extra-space . 0.1))`
A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(`*`break-align-symbol type . distance`*`)`, where *type* can be the symbols `minimum-space` or `extra-space`.

`stencil` (stencil):
`ly:custos::print`
The symbol to print.

`style` (symbol):
`'vaticana`
This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`Y-offset` (number):
`ly:staff-symbol-referencer::callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.22 [custos-interface], page 390, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.100 [staff-symbol-referencer-interface], page 431.

### 3.1.30 DotColumn

DotColumn objects are created by: Section 2.2.23 [Dot_column_engraver], page 226 and Section 2.2.124 [Vaticana_ligature_engraver], page 257.

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`.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Hard coded extent in X direction.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.23 [dot-column-interface], page 390, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.31 Dots

Dots objects are created by: Section 2.2.19 [Completion_heads_engraver], page 225 and Section 2.2.24 [Dots_engraver], page 226.

Standard settings:

`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)`.

`staff-position` (number):
`dots::calc-staff-position`

Vertical position, measured in half staff spaces, counted from the middle line.

`stencil` (stencil):
`ly:dots::print`

The symbol to print.

This object supports the following interface(s): Section 3.2.24 [dots-interface], page 391, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.100 [staff-symbol-referencer-interface], page 431.

### 3.1.32 DoublePercentRepeat

DoublePercentRepeat objects are created by: Section 2.2.78 [Percent_repeat_engraver], page 243.

Standard settings:

`break-align-symbol` (symbol):
`'staff-bar`

This key is used for aligning and spacing breakable items.

`break-visibility` (vector):
`#(#t #t #f)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`dot-negative-kern` (number):
`0.75`

The space to remove between a dot and a slash in percent repeat glyphs. Larger values bring the two elements closer together.

`font-encoding` (symbol):
`'fetaMusic`

The font encoding is the broadest category for selecting a font. Currently, only lilypond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`slash-negative-kern` (number):
`1.6`

The space to remove between slashes in percent repeat glyphs. Larger values bring the two elements closer together.

`slope` (number):
`1.0`

The slope of this object.

`stencil` (stencil):
`ly:percent-repeat-item-interface::double-percent`

The symbol to print.

`thickness` (number):
`0.48`

Line thickness, generally measured in `line-thickness`.

`width` (dimension, in staff space):
`2.0`

The width of a grob measured in staff space.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.73 [percent-repeat-interface], page 417 and Section 3.2.74 [percent-repeat-item-interface], page 417.

### 3.1.33 DoublePercentRepeatCounter

DoublePercentRepeatCounter objects are created by: Section 2.2.78 [Percent_repeat_engraver], page 243.

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-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. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.2`

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.

`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):
`#<simple-closure (#<primitive-generic +> #<simple-closure (#<primitive-procedure ly:self-alignment-interface::centered-on-y-parent>) > #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-aligned-on-self>) >) >`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.73 [percent-repeat-interface], page 417, Section 3.2.74 [percent-repeat-item-interface], page 417, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.110 [text-interface], page 436.

### 3.1.34 DynamicLineSpanner

DynamicLineSpanner objects are created by: Section 2.2.27 [Dynamic_align_engraver], page 227 and Section 2.2.28 [Dynamic_engraver], page 227.

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.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`
Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`
Hard coded extent in Y direction.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.25 [dynamic-interface], page 391, Section 3.2.26 [dynamic-line-spanner-interface], page 391, Section 3.2.39 [grob-interface], page 397, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.35 DynamicText

DynamicText objects are created by: Section 2.2.28 [Dynamic_engraver], page 227 and Section 2.2.65 [New_dynamic_engraver], page 239.

Standard settings:

`direction` (direction):
`ly:script-interface::calc-direction`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`
In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

`font-encoding` (symbol):
`'fetaText`
The font encoding is the broadest category for selecting a font. Currently, only lilypond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`font-series` (symbol):
`'bold`
Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`font-shape` (symbol):
`'italic`
Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`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.

`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.

`self-alignment-Y` (number):
`0`

Like `self-alignment-X` but for the Y axis.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`X-offset` (number):
`ly:self-alignment-interface::x-aligned-on-self`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:self-alignment-interface::y-aligned-on-self`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.25 [dynamic-interface], page 391, Section 3.2.27 [dynamic-text-interface], page 392, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.84 [script-interface], page 420, Section 3.2.85 [self-alignment-interface], page 421 and Section 3.2.110 [text-interface], page 436.

### 3.1.36 DynamicTextSpanner

DynamicTextSpanner objects are created by: Section 2.2.28 [Dynamic_engraver], page 227 and Section 2.2.65 [New_dynamic_engraver], page 239.

Standard settings:

`before-line-breaking` (boolean):
`dynamic-text-spanner::before-line-breaking`

Dummy property, used to trigger a callback function.

`bound-details` (list):
`'((right (attach-dir . -1) (Y . 0) (padding . 0.75)) (right-broken (attach-dir . 1) (padding . 0.0)) (left (attach-dir . -1) (Y . 0) (stencil-offset -0.75 . -0.5) (padding . 0.75)) (left-broken (attach-dir . 1)))`

An alist of properties for determining attachments of spanners to edges.

`dash-fraction` (number):
`0.2`

Size of the dashes, relative to `dash-period`. Should be between `0.0` (no line) and `1.0` (continuous line).

`dash-period` (number):
`3.0`

The length of one dash together with whitespace. If negative, no line is drawn at all.

`font-shape` (symbol):
`'italic`

Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number):
`1`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`left-bound-info` (list):
`ly:line-spanner::calc-left-bound-info-and-text`

An alist of properties for determining attachments of spanners to edges.

`minimum-Y-extent` (pair of numbers):
`'(-1 . 1)`

Minimum size of an object in Y dimension, measured in `staff-space` units.

`right-bound-info` (list):
`ly:line-spanner::calc-right-bound-info`

An alist of properties for determining attachments of spanners to edges.

`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.

This object supports the following interface(s): Section 3.2.25 [dynamic-interface], page 391, Section 3.2.28 [dynamic-text-spanner-interface], page 392, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.51 [line-interface], page 407, Section 3.2.52 [line-spanner-interface], page 408, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.110 [text-interface], page 436.

### 3.1.37 Episema

Episema objects are created by: Section 2.2.31 [Episema_engraver], page 228.

Standard settings:

`bound-details` (list):
`'((left (Y . 0) (padding . 0) (attach-dir . -1)) (right (Y . 0) (padding . 0) (attach-dir . 1)))`

An alist of properties for determining attachments of spanners to edges.

`direction` (direction):
`1`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`left-bound-info` (list):
`ly:line-spanner::calc-left-bound-info`

An alist of properties for determining attachments of spanners to edges.

`right-bound-info` (list):
`ly:line-spanner::calc-right-bound-info`

An alist of properties for determining attachments of spanners to edges.

`side-axis` (number):
`1`

If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`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):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.30 [episema-interface], page 393, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.51 [line-interface], page 407, Section 3.2.52 [line-spanner-interface], page 408, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.38 Fingering

Fingering objects are created by: Section 2.2.35 [Fingering_engraver], page 229 and Section 2.2.66 [New_fingering_engraver], page 240.

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):
`ly:script-interface::calc-direction`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`font-encoding` (symbol):
`'fetaText`

The font encoding is the broadest category for selecting a font. Currently, only lilypond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`font-size` (number):
`-5`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`script-priority` (number):
`100`

A sorting key that determines in what order a script is within a stack of scripts.

`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.

`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*.

This object supports the following interface(s): Section 3.2.32 [finger-interface], page 393, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423, Section 3.2.110 [text-interface], page 436 and Section 3.2.111 [text-script-interface], page 437.

### 3.1.39 FretBoard

FretBoard objects are created by: Section 2.2.38 [Fretboard_engraver], page 230.

Standard settings:

`after-line-breaking` (boolean):
`ly:chord-name::after-line-breaking`

Dummy property, used to trigger callback for `after-line-breaking`.

`fret-diagram-details` (list):
`'((finger-code . below-string))`

An alist of detailed grob properties for fret diagrams. Each alist entry consists of a `(`*`property . value`*`)` pair. The properties which can be included in `fret-diagram-details` include the following:

- `barre-type` – Type of barre indication used. Choices include `curved`, `straight`, and `none`. Default `curved`.
- `capo-thickness` – Thickness of capo indicator, in multiples of fret-space. Default value 0.5.
- `dot-color` – Color of dots. Options include `black` and `white`. Default `black`.
- `dot-label-font-mag` – Magnification for font used to label fret dots. Default value 1.
- `dot-position` – Location of dot in fret space. Default 0.6 for dots without labels, 0.95-`dot-radius` for dots with labels.
- `dot-radius` – Radius of dots, in terms of fret spaces. Default value 0.425 for labeled dots, 0.25 for unlabeled dots.
- `finger-code` – Code for the type of fingering indication used. Options include `none`, `in-dot`, and `below-string`. Default `none` for markup fret diagrams, `below-string` for `FretBoards` fret diagrams.
- `fret-count` – The number of frets. Default 4.
- `fret-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.
- `label-dir` – Side to which the fret label is attached. `-1`, `#LEFT`, or `#DOWN` for left or down; `1`, `#RIGHT`, or `#UP` for right or up. Default `#RIGHT`.
- `mute-string` – Character string to be used to indicate muted string. Default `"x"`.
- `number-type` – Type of numbers to use in fret label. Choices include `roman-lower`, `roman-upper`, and `arabic`. 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-label-font-mag` – The magnification of the font used to label fingerings at the string, rather than in the dot. Default value 0.6 for `normal` orientation, 0.5 for `landscape` and `opposing-landscape`.
- `string-thickness-factor` – Factor for changing thickness of each string in the fret diagram. Thickness of string $k$ is given by `thickness` * (1+`string-thickness-factor`) ^ ($k$-1). Default 0.
- `top-fret-thickness` – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.
- `xo-font-magnification` – Magnification used for mute and open string indicators. Default value 0.5.
- `xo-padding` – Padding for open and mute indicators from top fret. Default value 0.25.

`stencil` (stencil):
`fret-board::calc-stencil`

The symbol to print.

This object supports the following interface(s): Section 3.2.18 [chord-name-interface], page 389, Section 3.2.33 [font-interface], page 393, Section 3.2.34 [fret-diagram-interface], page 394, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.81 [rhythmic-grob-interface], page 419.

### 3.1.40 Glissando

Glissando objects are created by: Section 2.2.39 [Glissando_engraver], page 231 and Section 2.2.67 [Note_head_line_engraver], page 240.

Standard settings:

`after-line-breaking` (boolean):
`ly:spanner::kill-zero-spanned-time`

Dummy property, used to trigger callback for `after-line-breaking`.

`bound-details` (list):
`'((right (attach-dir . 0) (padding . 1.5)) (left (attach-dir . 0) (padding . 1.5)))`

An alist of properties for determining attachments of spanners to edges.

`gap` (dimension, in staff space):
`0.5`

Size of a gap in a variable symbol.

`left-bound-info` (list):
`ly:line-spanner::calc-left-bound-info`

An alist of properties for determining attachments of spanners to edges.

`right-bound-info` (list):
`ly:line-spanner::calc-right-bound-info`

An alist of properties for determining attachments of spanners to edges.

`stencil` (stencil):
`ly:line-spanner::print`
The symbol to print.

`style` (symbol):
`'line`
This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`X-extent` (pair of numbers)
Hard coded extent in X direction.

`Y-extent` (pair of numbers)
Hard coded extent in Y direction.

`zigzag-width` (dimension, in staff space):
`0.75`
The width of one zigzag squiggle. This number is adjusted slightly so that the glissando line can be constructed from a whole number of squiggles.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.51 [line-interface], page 407, Section 3.2.52 [line-spanner-interface], page 408, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.119 [unbreakable-spanner-interface], page 442.

### 3.1.41 GraceSpacing

GraceSpacing objects are created by: Section 2.2.42 [Grace_spacing_engraver], page 232.

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` (dimension, in staff space):
`1.6`
Start with this much space for the shortest duration. This is expressed in `spacing-increment` as unit. See also Section "spacing-spanner-interface" in *Internals Reference*.

`spacing-increment` (number):
`0.8`
Add this much space for a doubled duration. Typically, the width of a note head. See also Section "spacing-spanner-interface" in *Internals Reference*.

This object supports the following interface(s): Section 3.2.35 [grace-spacing-interface], page 396, Section 3.2.39 [grob-interface], page 397, Section 3.2.93 [spacing-options-interface], page 427 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.42 GridLine

GridLine objects are created by: Section 2.2.43 [Grid_line_span_engraver], page 232.

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.

`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.

`stencil` (stencil):
`ly:grid-line-interface::print`

The symbol to print.

`X-extent` (pair of numbers):
`ly:grid-line-interface::width`

Hard coded extent in X direction.

`X-offset` (number):
`#<simple-closure (#<primitive-generic +> #<simple-closure (#<primitive-procedure ly:self-alignment-interface::centered-on-x-parent>) > #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-aligned-on-self>) >) >`

The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.37 [grid-line-interface], page 397, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.85 [self-alignment-interface], page 421.

### 3.1.43 GridPoint

GridPoint objects are created by: Section 2.2.44 [Grid_point_engraver], page 232.

Standard settings:

`X-extent` (pair of numbers):
`'(0 . 0)`

Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`'(0 . 0)`

Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.38 [grid-point-interface], page 397, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.44 Hairpin

Hairpin objects are created by: Section 2.2.28 [Dynamic_engraver], page 227 and Section 2.2.65 [New_dynamic_engraver], page 239.

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.

`circled-tip` (boolean)
Put a circle at start/end of hairpins (al/del niente).

`grow-direction` (direction):
`hairpin::calc-grow-direction`
Crescendo or decrescendo?

`height` (dimension, in staff space):
`0.6666`
Height of an object in `staff-space` units.

`minimum-length` (dimension, in staff space):
`2.0`
Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`self-alignment-Y` (number):
`0`
Like `self-alignment-X` but for the Y axis.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`
Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:hairpin::print`
The symbol to print.

`thickness` (number):
`1.0`
Line thickness, generally measured in `line-thickness`.

`to-barline` (boolean):
`#t`
If true, the spanner will stop at the bar line just before it would otherwise stop.

`Y-offset` (number):
`ly:self-alignment-interface::y-aligned-on-self`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.25 [dynamic-interface], page 391, Section 3.2.39 [grob-interface], page 397, Section 3.2.40 [hairpin-interface], page 401, Section 3.2.51 [line-interface], page 407, Section 3.2.85 [self-alignment-interface], page 421 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.45 HarmonicParenthesesItem

HarmonicParenthesesItem objects are created by: Section 2.2.109 [Tab_harmonic_engraver], page 252.

Standard settings:

`padding` (dimension, in staff space):
`0`
Add this much extra space between objects that are next to each other.

`stencil` (stencil):
`parentheses-item::print`
The symbol to print.

`stencils` (list):
`parentheses-item::calc-angled-bracket-stencils`
Multiple stencils, used as intermediate value.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.72 [parentheses-interface], page 416.

### 3.1.46 HorizontalBracket

HorizontalBracket objects are created by: Section 2.2.47 [Horizontal_bracket_engraver], page 233.

Standard settings:

`bracket-flare` (pair of numbers):
`'(0.5 . 0.5)`
A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`connect-to-neighbor` (pair):
`ly:tuplet-bracket::calc-connect-to-neighbors`
Pair of booleans, indicating whether this grob looks as a continued break.

`direction` (direction):
`-1`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`padding` (dimension, in staff space):
`0.2`
Add this much extra space between objects that are next to each other.

`side-axis` (number):
`1`
If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`staff-padding` (dimension, in staff space):
`0.2`

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

`stencil` (stencil):
`ly:horizontal-bracket::print`
The symbol to print.

`thickness` (number):
`1.0`
Line thickness, generally measured in `line-thickness`.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.42 [horizontal-bracket-interface], page 402, Section 3.2.51 [line-interface], page 407, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.47 InstrumentName

InstrumentName objects are created by: Section 2.2.49 [Instrument_name_engraver], page 234.

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.

`self-alignment-Y` (number):
`0`
Like `self-alignment-X` but for the Y axis.

`stencil` (stencil):
`system-start-text::print`
The symbol to print.

`X-offset` (number):
`system-start-text::calc-x-offset`
The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`system-start-text::calc-y-offset`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.108 [system-start-text-interface], page 436.

### 3.1.48 InstrumentSwitch

InstrumentSwitch objects are created by: Section 2.2.50 [Instrument_switch_engraver], page 234.

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.

`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.

`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::x-aligned-on-self`
The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.110 [text-interface], page 436.

### 3.1.49 KeyCancellation

KeyCancellation objects are created by: Section 2.2.52 [Key_engraver], page 235.

Standard settings:

`break-align-symbol` (symbol):
`'key-cancellation`
This key is used for aligning and spacing breakable items.

`break-visibility` (vector):
`#(#t #t #f)`
A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`glyph-name-alist` (list):
`'((0 . accidentals.natural))`
An alist of key-string pairs.

`non-musical` (boolean):
`#t`
True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):
`'((time-signature extra-space . 1.25) (staff-bar extra-space . 0.6) (key-signature extra-space . 0.5) (right-edge extra-space . 0.5) (first-note fixed-space . 2.5))`
A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(`*`break-align-symbol type . distance`*`)`, where *type* can be the symbols `minimum-space` or `extra-space`.

`stencil` (stencil):
`ly:key-signature-interface::print`
The symbol to print.

`Y-offset` (number):
`ly:staff-symbol-referencer::callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.45 [key-cancellation-interface], page 406, Section 3.2.46 [key-signature-interface], page 406 and Section 3.2.100 [staff-symbol-referencer-interface], page 431.

### 3.1.50 KeySignature

KeySignature objects are created by: Section 2.2.52 [Key_engraver], page 235.

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 break-align grob 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):
`'key-signature`

This key is used for aligning and spacing breakable items.

`break-visibility` (vector):
`#(#f #f #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`glyph-name-alist` (list):
`'((0 . accidentals.natural) (-1/2 . accidentals.flat) (1/2 . accidentals.sharp) (1 . accidentals.doublesharp) (-1 . accidentals.flatflat) (3/4 . accidentals.sharp.slashslash.stemstemstem) (1/4 . accidentals.sharp.slashslash.stem) (-1/4 . accidentals.mirroredflat) (-3/4 . accidentals.mirroredflat.flat))`

An alist of key-string pairs.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):
`'((time-signature extra-space . 1.15) (staff-bar extra-space . 1.1) (right-edge extra-space . 0.5) (first-note fixed-space . 2.5))`

A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(`*`break-align-symbol type . distance`*`)`, where *type* can be the symbols `minimum-space` or `extra-space`.

`stencil` (stencil):
`ly:key-signature-interface::print`

The symbol to print.

`Y-offset` (number):
`ly:staff-symbol-referencer::callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.46 [key-signature-interface], page 406 and Section 3.2.100 [staff-symbol-referencer-interface], page 431.

### 3.1.51 LaissezVibrerTie

LaissezVibrerTie objects are created by: Section 2.2.54 [Laissez_vibrer_engraver], page 236.

Standard settings:

`control-points` (list):
`ly:semi-tie::calc-control-points`
List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

`details` (list):
`'((ratio . 0.333) (height-limit . 1.0))`
Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction):
`ly:tie::calc-direction`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`extra-spacing-height` (pair of numbers):
`'(-0.5 . 0.5)`
In the horizontal spacing problem, we increase the height of each item by this amount (by adding the 'car' to the bottom of the item and adding the 'cdr' to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to `(-inf.0 . +inf.0)`.

`head-direction` (direction):
`-1`
Are the note heads left or right in a semitie?

`stencil` (stencil):
`laissez-vibrer::print`
The symbol to print.

`thickness` (number):
`1.0`
Line thickness, generally measured in `line-thickness`.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.87 [semi-tie-interface], page 422.

### 3.1.52 LaissezVibrerTieColumn

LaissezVibrerTieColumn objects are created by: Section 2.2.54 [Laissez_vibrer_engraver], page 236.

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)
Hard coded extent in X direction.

`Y-extent` (pair of numbers)
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.86 [semi-tie-column-interface], page 421.

### 3.1.53 LedgerLineSpanner

LedgerLineSpanner objects are created by: Section 2.2.55 [Ledger_line_engraver], page 236.

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.

`X-extent` (pair of numbers)
Hard coded extent in X direction.

`Y-extent` (pair of numbers)
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.47 [ledger-line-spanner-interface], page 406 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.54 LeftEdge

LeftEdge objects are created by: Section 2.2.12 [Break_align_engraver], page 222.

Standard settings:

`break-align-anchor` (number):
`ly:break-aligned-interface::calc-extent-aligned-anchor`
Grobs aligned to this break-align grob 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 and spacing breakable items.

`break-visibility` (vector):
`#(#t #f #t)`
A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`non-musical` (boolean):
`#t`
True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):
`'((custos extra-space . 0.0) (ambitus extra-space . 2.0) (time-signature extra-space . 1.0) (staff-bar extra-space . 0.0) (breathing-sign minimum-space . 0.0) (clef extra-space . 0.8) (first-note fixed-space . 2.0) (right-edge extra-space . 0.0) (key-signature extra-space . 0.8) (key-cancellation extra-space . 0.0))`
A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(`*`break-align-symbol type . distance`*`)`, where *type* can be the symbols `minimum-space` or `extra-space`.

`X-extent` (pair of numbers):
`'(0 . 0)`
Hard coded extent in X direction.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.39 [grob-interface], page 397 and Section 3.2.44 [item-interface], page 404.

### 3.1.55 LigatureBracket

LigatureBracket objects are created by: Section 2.2.56 [Ligature_bracket_engraver], page 236.

Standard settings:

`connect-to-neighbor` (pair):
`ly:tuplet-bracket::calc-connect-to-neighbors`
Pair of booleans, indicating whether this grob looks as a continued break.

`control-points` (list):
`ly:tuplet-bracket::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.

`direction` (direction):
`1`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`edge-height` (pair):
`'(0.7 . 0.7)`

A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`padding` (dimension, in staff space):
`2.0`

Add this much extra space between objects that are next to each other.

`positions` (pair of numbers):
`ly:tuplet-bracket::calc-positions`

Pair of staff coordinates `(`*`left . right`*`)`, where both *left* and *right* are in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`shorten-pair` (pair of numbers):
`'(-0.2 . -0.2)`

The lengths to shorten a text-spanner on both sides, for example a pedal bracket. Positive values shorten the 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`

Line thickness, generally measured in `line-thickness`.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.51 [line-interface], page 407, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.117 [tuplet-bracket-interface], page 440.

### 3.1.56 LyricExtender

LyricExtender objects are created by: Section 2.2.32 [Extender_engraver], page 228.

Standard settings:

`minimum-length` (dimension, in staff space):
`1.5`

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`stencil` (stencil):
`ly:lyric-extender::print`
The symbol to print.

`thickness` (number):
`0.8`
Line thickness, generally measured in `line-thickness`.

`Y-extent` (pair of numbers):
`'(0 . 0)`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.53 [lyric-extender-interface], page 409, Section 3.2.55 [lyric-interface], page 410 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.57 LyricHyphen

LyricHyphen objects are created by: Section 2.2.48 [Hyphen_engraver], page 233.

Standard settings:

`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.

`minimum-distance` (dimension, in staff space):
`0.1`
Minimum distance between rest and notes or beam.

`minimum-length` (dimension, in staff space):
`0.3`
Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`padding` (dimension, in staff space):
`0.07`
Add this much extra space between objects that are next to each other.

`springs-and-rods` (boolean):
`ly:lyric-hyphen::set-spacing-rods`
Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:lyric-hyphen::print`
The symbol to print.

`thickness` (number):
`1.3`
Line thickness, generally measured in `line-thickness`.

`Y-extent` (pair of numbers):
`'(0 . 0)`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.54 [lyric-hyphen-interface], page 409, Section 3.2.55 [lyric-interface], page 410 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.58 LyricSpace

LyricSpace objects are created by: Section 2.2.48 [Hyphen_engraver], page 233.

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)
Hard coded extent in X direction.

`Y-extent` (pair of numbers)
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.54 [lyric-hyphen-interface], page 409 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.59 LyricText

LyricText objects are created by: Section 2.2.57 [Lyric_engraver], page 236.

Standard settings:

`extra-spacing-width` (pair of numbers):
`'(0.0 . 0.0)`
In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

`font-series` (symbol):
`'medium`
Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`font-size` (number):
`1.0`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. 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.

`stencil` (stencil):
`lyric-text::print`

The symbol to print.

`text` (markup):
`#<procedure #f (grob)>`

Text markup. See Section "Formatting text" in *Notation Reference*.

`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.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.56 [lyric-syllable-interface], page 410, Section 3.2.81 [rhythmic-grob-interface], page 419, Section 3.2.85 [self-alignment-interface], page 421 and Section 3.2.110 [text-interface], page 436.

### 3.1.60 MeasureGrouping

MeasureGrouping objects are created by: Section 2.2.60 [Measure_grouping_engraver], page 237.

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`

Line thickness, generally measured in `line-thickness`.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.58 [measure-grouping-interface], page 410, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.61 MelodyItem

MelodyItem objects are created by: Section 2.2.61 [Melody_engraver], page 238.

Standard settings:

`neutral-direction` (direction):
`-1`

Which direction to take in the center of the staff.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.59 [melody-spanner-interface], page 410.

### 3.1.62 MensuralLigature

MensuralLigature objects are created by: Section 2.2.62 [Mensural_ligature_engraver], page 238.

Standard settings:

`stencil` (stencil):
`ly:mensural-ligature::print`

The symbol to print.

`thickness` (number):
`1.4`

Line thickness, generally measured in `line-thickness`.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.60 [mensural-ligature-interface], page 411 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.63 MetronomeMark

MetronomeMark objects are created by: Section 2.2.63 [Metronome_mark_engraver], page 238.

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 symbols that determine which break-aligned grobs 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 `left-edge`, `ambitus`, `breathing-sign`, `clef`, `staff-bar`, `key-cancellation`, `key-signature`, `time-signature`, and `custos`.

`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)`.

`non-break-align-symbols` (list):
`'(multi-measure-rest-interface)`

A list of symbols that determine which NON-break-aligned interfaces to align this to.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`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):
`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.

`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):
`#<simple-closure (#<primitive-generic +> #<simple-closure (#<primitive-procedure ly:break-alignable-interface::self-align-callback>) > #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-aligned-on-self>) >) >`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.14 [break-alignable-interface], page 387, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.61 [metronome-mark-interface], page 411, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.110 [text-interface], page 436.

### 3.1.64 MultiMeasureRest

MultiMeasureRest objects are created by: Section 2.2.64 [Multi_measure_rest_engraver], page 238.

Standard settings:

`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.

`padding` (dimension, in staff space):
`1`

Add this much extra space between objects that are next to each other.

`spacing-pair` (pair):
`'(break-alignment . break-alignment)`

A pair of alignment symbols which set an object's spacing relative to its left and right `BreakAlignment`s.

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.

`staff-position` (number):
`0`
Vertical position, measured in half staff spaces, counted from the middle line.

`stencil` (stencil):
`ly:multi-measure-rest::print`
The symbol to print.

`thick-thickness` (number):
`6.6`
Bar line thickness, measured in `line-thickness`.

`Y-offset` (number):
`ly:staff-symbol-referencer::callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.62 [multi-measure-interface], page 411, Section 3.2.63 [multi-measure-rest-interface], page 411, Section 3.2.80 [rest-interface], page 419, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.100 [staff-symbol-referencer-interface], page 431.

### 3.1.65 MultiMeasureRestNumber

MultiMeasureRestNumber objects are created by: Section 2.2.64 [Multi_measure_rest_engraver], page 238.

Standard settings:

`bound-padding` (number):
`2.0`
The amount of padding to insert around spanner bounds.

`direction` (direction):
`1`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`font-encoding` (symbol):
`'fetaText`
The font encoding is the broadest category for selecting a font. Currently, only lilypond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`padding` (dimension, in staff space):
`0.4`
Add this much extra space between objects that are next to each other.

`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.

`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.

`X-offset` (number):
`#<simple-closure (#<primitive-generic +> #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-aligned-on-self>) > #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-centered-on-y-parent>) >) >`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.62 [multi-measure-interface], page 411, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.110 [text-interface], page 436.

### 3.1.66 MultiMeasureRestText

MultiMeasureRestText objects are created by: Section 2.2.64 [Multi_measure_rest_engraver], page 238.

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.

`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.

`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):
`#<simple-closure (#<primitive-generic +> #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-centered-on-y-parent>) > #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-aligned-on-self>) >) >`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.62 [multi-measure-interface], page 411, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.110 [text-interface], page 436.

### 3.1.67 NonMusicalPaperColumn

NonMusicalPaperColumn objects are created by: Section 2.2.75 [Paper_column_engraver], page 242.

Standard settings:

`allow-loose-spacing` (boolean):
`#t`

If set, column can be detached from main spacing.

`axes` (list):
`'(0)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`before-line-breaking` (boolean):
`ly:paper-column::before-line-breaking`
Dummy property, used to trigger a callback function.

`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.

`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`
Hard coded extent in X direction.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.71 [paper-column-interface], page 415, Section 3.2.88 [separation-item-interface], page 422 and Section 3.2.91 [spaceable-grob-interface], page 426.

### 3.1.68 NoteCollision

NoteCollision objects are created by: Section 2.2.18 [Collision_engraver], page 224.

Standard settings:

`axes` (list):
`'(0 1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`prefer-dotted-right` (boolean):
`#t`
For note collisions, prefer to shift dotted up-note to the right, rather than shifting just the dot.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`
Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.64 [note-collision-interface], page 412.

### 3.1.69 NoteColumn

NoteColumn objects are created by: Section 2.2.89 [Rhythmic_column_engraver], page 247.

Standard settings:

`axes` (list):
`'(0 1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`horizontal-skylines` (pair of skylines):
`ly:separation-item::calc-skylines`
Two skylines, one to the left and one to the right of this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`
Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.65 [note-column-interface], page 413 and Section 3.2.88 [separation-item-interface], page 422.

### 3.1.70 NoteHead

NoteHead objects are created by: Section 2.2.19 [Completion_heads_engraver], page 225, Section 2.2.26 [Drum_notes_engraver], page 227 and Section 2.2.68 [Note_heads_engraver], page 240.

Standard settings:

`duration-log` (integer):
`note-head::calc-duration-log`
The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`extra-spacing-height` (pair of numbers):
`ly:note-head::include-ledger-line-height`
In the horizontal spacing problem, we increase the height of each item by this amount (by adding the 'car' to the bottom of the item and adding the 'cdr' to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to `(-inf.0 . +inf.0)`.

`glyph-name` (string):
`note-head::calc-glyph-name`
The glyph name within the font.

`stem-attachment` (pair of numbers):
`ly:note-head::calc-stem-attachment`
An `(x . y)` pair where the stem attaches to the notehead.

`stencil` (stencil):
`ly:note-head::print`
The symbol to print.

`X-offset` (number):
`ly:note-head::stem-x-shift`
The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:staff-symbol-referencer::callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.36 [gregorian-ligature-interface], page 396, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.48 [ledgered-interface], page 407, Section 3.2.60 [mensural-ligature-interface], page 411, Section 3.2.66 [note-head-interface], page 413, Section 3.2.81 [rhythmic-grob-interface], page 419, Section 3.2.82 [rhythmic-head-interface], page 419, Section 3.2.100 [staff-symbol-referencer-interface], page 431 and Section 3.2.120 [vaticana-ligature-interface], page 442.

### 3.1.71 NoteName

NoteName objects are created by: Section 2.2.69 [Note_name_engraver], page 241.

Standard settings:

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.67 [note-name-interface], page 414 and Section 3.2.110 [text-interface], page 436.

### 3.1.72 NoteSpacing

NoteSpacing objects are created by: Section 2.2.71 [Note_spacing_engraver], page 241.

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): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.68 [note-spacing-interface], page 414 and Section 3.2.92 [spacing-interface], page 427.

### 3.1.73 OctavateEight

OctavateEight objects are created by: Section 2.2.16 [Clef_engraver], page 224.

Standard settings:

`break-visibility` (vector):
`#(#f #f #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`font-shape` (symbol):
`'italic`

Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number):
`-4`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. 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.

`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:text-interface::print`

The symbol to print.

`X-offset` (number):
`#<simple-closure (#<primitive-generic +> #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-aligned-on-self>) > #<simple-closure (#<primitive-procedure ly:self-alignment-interface::centered-on-x-parent>) >) >`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.110 [text-interface], page 436.

### 3.1.74 OttavaBracket

OttavaBracket objects are created by: Section 2.2.72 [Ottava_spanner_engraver], page 241.

Standard settings:

`dash-fraction` (number):
`0.3`

Size of the dashes, relative to `dash-period`. Should be between `0.0` (no line) and `1.0` (continuous line).

`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 . 1.2)`

A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`font-shape` (symbol):
`'italic`

Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`minimum-length` (dimension, in staff space):
`1.0`

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`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):
`'(0.0 . -0.6)`

The lengths to shorten a text-spanner on both sides, for example a pedal bracket. Positive values shorten the text-spanner, while negative values lengthen it.

`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: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.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.42 [horizontal-bracket-interface], page 402, Section 3.2.51 [line-interface], page 407, Section 3.2.70 [ottava-bracket-interface], page 415, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.110 [text-interface], page 436.

### 3.1.75 PaperColumn

PaperColumn objects are created by: Section 2.2.75 [Paper_column_engraver], page 242.

Standard settings:

`allow-loose-spacing` (boolean):
`#t`

If set, column can be detached from main spacing.

`axes` (list):
`'(0)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`before-line-breaking` (boolean):
`ly:paper-column::before-line-breaking`

Dummy property, used to trigger a callback function.

`horizontal-skylines` (pair of skylines):
`ly:separation-item::calc-skylines`

Two skylines, one to the left and one to the right of this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Hard coded extent in X direction.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.71 [paper-column-interface], page 415, Section 3.2.88 [separation-item-interface], page 422 and Section 3.2.91 [spaceable-grob-interface], page 426.

### 3.1.76 ParenthesesItem

ParenthesesItem objects are created by: Section 2.2.76 [Parenthesis_engraver], page 243.

Standard settings:

`font-size` (number):
`-6`
The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.2`
Add this much extra space between objects that are next to each other.

`stencil` (stencil):
`parentheses-item::print`
The symbol to print.

`stencils` (list):
`parentheses-item::calc-parenthesis-stencils`
Multiple stencils, used as intermediate value.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.72 [parentheses-interface], page 416.

### 3.1.77 PercentRepeat

PercentRepeat objects are created by: Section 2.2.78 [Percent_repeat_engraver], page 243.

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).

`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 `BreakAlignment`s.

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::percent`

The symbol to print.

`thickness` (number):
`0.48`

Line thickness, generally measured in `line-thickness`.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.63 [multi-measure-rest-interface], page 411, Section 3.2.73 [percent-repeat-interface], page 417 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.78 PercentRepeatCounter

PercentRepeatCounter objects are created by: Section 2.2.78 [Percent_repeat_engraver], page 243.

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-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. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.2`

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.

`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):
`#<simple-closure (#<primitive-generic +> #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-centered-on-y-parent>) > #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-aligned-on-self>) >) >`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.73 [percent-repeat-interface], page 417, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.110 [text-interface], page 436.

### 3.1.79 PhrasingSlur

PhrasingSlur objects are created by: Section 2.2.79 [Phrasing_slur_engraver], page 244.

Standard settings:

`control-points` (list):
`ly:slur::calc-control-points`

List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

`details` (list):
`'((region-size . 4) (head-encompass-penalty . 1000.0) (stem-encompass-penalty . 30.0) (closeness-factor . 10) (edge-attraction-factor . 4) (same-slope-penalty . 20) (steeper-slope-factor . 50) (non-horizontal-penalty . 15) (max-slope . 1.1) (max-slope-factor . 10) (free-head-distance . 0.3) (free-slur-distance . 0.8) (extra-object-collision-penalty . 50) (accidental-collision . 3) (extra-encompass-free-distance . 0.3) (extra-encompass-collision-distance . 0.8) (head-slur-distance-max-ratio . 3) (head-slur-distance-factor . 10) (absolute-closeness-measure . 0.3) (edge-slope-exponent . 1.7))`

Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction):
`ly:slur::calc-direction`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`height-limit` (dimension, in staff space):
`2.0`

Maximum slur height: The longer the slur, the closer it is to this height.

`minimum-length` (dimension, in staff space):
`1.5`

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`ratio` (number):
`0.333`

Parameter for slur shape. The higher this number, the quicker the slur attains its `height-limit`.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`

Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:slur::print`

The symbol to print.

`thickness` (number):
`1.1`

Line thickness, generally measured in `line-thickness`.

`Y-extent` (pair of numbers):
`ly:slur::height`

Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.90 [slur-interface], page 424 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.80 PianoPedalBracket

PianoPedalBracket objects are created by: Section 2.2.81 [Piano_pedal_engraver], page 245.

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 a text-spanner on both sides, for example a pedal bracket. Positive values shorten the 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`

Line thickness, generally measured in `line-thickness`.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.51 [line-interface], page 407, Section 3.2.75 [piano-pedal-bracket-interface], page 418, Section 3.2.76 [piano-pedal-interface], page 418 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.81 RehearsalMark

RehearsalMark objects are created by: Section 2.2.59 [Mark_engraver], page 237.

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 clef)`

A list of symbols that determine which break-aligned grobs 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 `left-edge`, `ambitus`, `breathing-sign`, `clef`, `staff-bar`, `key-cancellation`, `key-signature`, `time-signature`, and `custos`.

`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. Fractional values are allowed.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`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):
`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.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`X-offset` (number):
`#<simple-closure (#<primitive-generic +> #<simple-closure (#<primitive-procedure ly:break-alignable-interface::self-align-callback>) > #<simple-closure (#<primitive-procedure ly:self-alignment-interface::x-aligned-on-self>) >) >`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.14 [break-alignable-interface], page 387, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.57 [mark-interface], page 410, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.110 [text-interface], page 436.

### 3.1.82 RepeatSlash

RepeatSlash objects are created by: Section 2.2.95 [Slash_repeat_engraver], page 249.

Standard settings:

`slope` (number):
`1.7`

The slope of this object.

`stencil` (stencil):
`ly:percent-repeat-item-interface::beat-slash`

The symbol to print.

`thickness` (number):
`0.48`

Line thickness, generally measured in `line-thickness`.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.73 [percent-repeat-interface], page 417, Section 3.2.74 [percent-repeat-item-interface], page 417 and Section 3.2.81 [rhythmic-grob-interface], page 419.

### 3.1.83 RepeatTie

RepeatTie objects are created by: Section 2.2.86 [Repeat_tie_engraver], page 246.

Standard settings:

`control-points` (list):
`ly:semi-tie::calc-control-points`

List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

`details` (list):
`'((ratio . 0.333) (height-limit . 1.0))`

Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction):
`ly:tie::calc-direction`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`extra-spacing-height` (pair of numbers):
`'(-0.5 . 0.5)`

In the horizontal spacing problem, we increase the height of each item by this amount (by adding the 'car' to the bottom of the item and adding the 'cdr' to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to `(-inf.0 . +inf.0)`.

`head-direction` (direction):
`1`

Are the note heads left or right in a semitie?

`stencil` (stencil):
`ly:tie::print`

The symbol to print.

`thickness` (number):
`1.0`

Line thickness, generally measured in `line-thickness`.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.87 [semi-tie-interface], page 422.

### 3.1.84 RepeatTieColumn

RepeatTieColumn objects are created by: Section 2.2.86 [Repeat_tie_engraver], page 246.

Standard settings:

`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`.

`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)
Hard coded extent in X direction.

`Y-extent` (pair of numbers)
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.86 [semi-tie-column-interface], page 421.

### 3.1.85 Rest

Rest objects are created by: Section 2.2.88 [Rest_engraver], page 247.

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.

`stencil` (stencil):
`ly:rest::print`
The symbol to print.

`X-extent` (pair of numbers):
`ly:rest::width`
Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:rest::height`
Hard coded extent in Y direction.

`Y-offset` (number):
`ly:rest::y-offset-callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.80 [rest-interface], page 419, Section 3.2.81 [rhythmic-grob-interface], page 419, Section 3.2.82 [rhythmic-head-interface], page 419 and Section 3.2.100 [staff-symbol-referencer-interface], page 431.

### 3.1.86 RestCollision

RestCollision objects are created by: Section 2.2.87 [Rest_collision_engraver], page 246.

Standard settings:

`minimum-distance` (dimension, in staff space):
`0.75`
Minimum distance between rest and notes or beam.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.79 [rest-collision-interface], page 418.

### 3.1.87 Script

Script objects are created by: Section 2.2.26 [Drum_notes_engraver], page 227, Section 2.2.66 [New_fingering_engraver], page 240 and Section 2.2.92 [Script_engraver], page 248.

Standard settings:

`add-stem-support` (boolean):
`#t`
If set, the `Stem` object is included in this script's support.

`direction` (direction):
`ly:script-interface::calc-direction`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`font-encoding` (symbol):
`'fetaMusic`

The font encoding is the broadest category for selecting a font. Currently, only lilypond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`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.

`X-offset` (number):
`script-interface::calc-x-offset`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.84 [script-interface], page 420 and Section 3.2.89 [side-position-interface], page 423.

### 3.1.88 ScriptColumn

ScriptColumn objects are created by: Section 2.2.91 [Script_column_engraver], page 247.

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): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.83 [script-column-interface], page 420.

### 3.1.89 ScriptRow

ScriptRow objects are created by: Section 2.2.93 [Script_row_engraver], page 248.

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): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.83 [script-column-interface], page 420.

### 3.1.90 Slur

Slur objects are created by: Section 2.2.96 [Slur_engraver], page 249.

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):
`ly:slur::calc-control-points`

List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

`details` (list):
`'((region-size . 4) (head-encompass-penalty . 1000.0) (stem-encompass-penalty . 30.0) (closeness-factor . 10) (edge-attraction-factor . 4) (same-slope-penalty . 20) (steeper-slope-factor . 50) (non-horizontal-penalty . 15) (max-slope . 1.1) (max-slope-factor . 10) (free-head-distance . 0.3) (free-slur-distance . 0.8) (extra-object-collision-penalty . 50) (accidental-collision . 3) (extra-encompass-free-distance . 0.3) (extra-encompass-collision-distance . 0.8) (head-slur-distance-max-ratio . 3) (head-slur-distance-factor . 10) (absolute-closeness-measure . 0.3) (edge-slope-exponent . 1.7))`

Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction):
`ly:slur::calc-direction`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`height-limit` (dimension, in staff space):
`2.0`
Maximum slur height: The longer the slur, the closer it is to this height.

`line-thickness` (number):
`0.8`
The thickness of the tie or slur contour.

`minimum-length` (dimension, in staff space):
`1.5`
Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`ratio` (number):
`0.25`
Parameter for slur shape. The higher this number, the quicker the slur attains its `height-limit`.

`springs-and-rods` (boolean):
`ly:spanner::set-spacing-rods`
Dummy variable for triggering spacing routines.

`stencil` (stencil):
`ly:slur::print`
The symbol to print.

`thickness` (number):
`1.2`
Line thickness, generally measured in `line-thickness`.

`Y-extent` (pair of numbers):
`ly:slur::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.90 [slur-interface], page 424 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.91 SostenutoPedal

SostenutoPedal objects are created by: Section 2.2.81 [Piano_pedal_engraver], page 245.

Standard settings:

`direction` (direction):
`1`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`
In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the

right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

`font-shape` (symbol):
`'italic`
Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`padding` (dimension, in staff space):
`0.0`
Add this much extra space between objects that are next to each other.

`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.

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`X-offset` (number):
`ly:self-alignment-interface::x-aligned-on-self`
The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.77 [piano-pedal-script-interface], page 418, Section 3.2.85 [self-alignment-interface], page 421 and Section 3.2.110 [text-interface], page 436.

### 3.1.92 SostenutoPedalLineSpanner

SostenutoPedalLineSpanner objects are created by: Section 2.2.80 [Piano_pedal_align_engraver], page 244.

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.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`

Hard coded extent in Y direction.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.39 [grob-interface], page 397, Section 3.2.76 [piano-pedal-interface], page 418, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.93 SpacingSpanner

SpacingSpanner objects are created by: Section 2.2.98 [Spacing_engraver], page 249.

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` (dimension, in staff space):
`2.0`

Start with this much space for the shortest duration. This is expressed in `spacing-increment` as unit. See also Section "spacing-spanner-interface" in *Internals Reference*.

`spacing-increment` (number):
`1.2`

Add this much space for a doubled duration. Typically, the width of a note head. See also Section "spacing-spanner-interface" in *Internals Reference*.

`springs-and-rods` (boolean):
`ly:spacing-spanner::set-springs`

Dummy variable for triggering spacing routines.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.93 [spacing-options-interface], page 427, Section 3.2.94 [spacing-spanner-interface], page 428 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.94 SpanBar

SpanBar objects are created by: Section 2.2.100 [Span_bar_engraver], page 250.

Standard settings:

`allow-span-bar` (boolean):
`#t`

If false, no inter-staff bar line will be created below this bar line.

`bar-size` (dimension, in staff space):
`ly:span-bar::calc-bar-size`

The size of a bar line.

`before-line-breaking` (boolean):
`ly:span-bar::before-line-breaking`

Dummy property, used to trigger a callback function.

`break-align-symbol` (symbol):
`'staff-bar`

This key is used for aligning and spacing breakable items.

`glyph-name` (string):
`ly:span-bar::calc-glyph-name`

The glyph name within the font.

`hair-thickness` (number):
`1.6`

Thickness of the thin line in a bar line.

`kern` (dimension, in staff space):
`3.0`

Amount of extra white space to add. For bar lines, this is the amount of space after a thick line.

`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.

`thick-thickness` (number):
`6.0`
Bar line thickness, measured in `line-thickness`.

`thin-kern` (number):
`3.0`
The space after a hair-line in a bar line.

`X-extent` (pair of numbers):
`ly:span-bar::width`
Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.9 [bar-line-interface], page 383, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.95 [span-bar-interface], page 428.

### 3.1.95 StaffGrouper

StaffGrouper objects are not created by any engraver.

Standard settings:

`staff-staff-spacing` (list):
`'((space . 9) (stretchability . 5) (minimum-distance . 7) (padding . 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:

- `padding` – the minimum required amount of unobstructed vertical whitespace between the two items, measured in staff-spaces.
- `space` – 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.
- `stretchability` – a unitless measure of the dimension's relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result).

`staffgroup-staff-spacing` (list):
`'((space . 10.5) (stretchability . 9) (minimum-distance . 8) (padding . 1))`

The spacing alist controlling the distance between the last staff of the current staff-group and the staff just below it in the same system, even if one or more non-staff lines exist between the two staves. If the `staff-staff-spacing` property of the staff's `VerticalAxisGroup` grob is set, that is used instead. See `staff-staff-spacing` for a description of the alist structure.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.97 [staff-grouper-interface], page 430.

### 3.1.96 StaffSpacing

StaffSpacing objects are created by: Section 2.2.94 [Separating_line_group_engraver], page 248.

Standard settings:

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`stem-spacing-correction` (number):
`0.4`

Optical correction amount for stems that are placed in tight configurations. For opposite directions, this amount is the correction for two normal sized stems that overlap completely.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.92 [spacing-interface], page 427 and Section 3.2.98 [staff-spacing-interface], page 430.

### 3.1.97 StaffSymbol

StaffSymbol objects are created by: Section 2.2.104 [Staff_symbol_engraver], page 251 and Section 2.2.111 [Tab_staff_symbol_engraver], page 253.

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.

`ledger-line-thickness` (pair of numbers):
`'(1.0 . 0.1)`

The thickness of ledger lines. It is the sum of 2 numbers: The first is the factor for line thickness, and the second for staff space. Both contributions are added.

`line-count` (integer):
`5`

The number of staff lines.

`stencil` (stencil):
`ly:staff-symbol::print`
The symbol to print.

`Y-extent` (pair of numbers):
`ly:staff-symbol::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.99 [staff-symbol-interface], page 431.

### 3.1.98 StanzaNumber

StanzaNumber objects are created by: Section 2.2.106 [Stanza_number_engraver], page 251.

Standard settings:

`direction` (direction):
`-1`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`font-series` (symbol):
`'bold`
Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`padding` (dimension, in staff space):
`1.0`
Add this much extra space between objects that are next to each other.

`side-axis` (number):
`0`
If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`
The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.89 [side-position-interface], page 423, Section 3.2.101 [stanza-number-interface], page 432 and Section 3.2.110 [text-interface], page 436.

### 3.1.99 Stem

Stem objects are created by: Section 2.2.107 [Stem_engraver], page 251.

Standard settings:

`beamlet-default-length` (pair):
`'(1.1 . 1.1)`

A pair of numbers. The first number specifies the default length of a beamlet that sticks out of the left hand side of this stem; the second number specifies the default length of the beamlet to the right. The actual length of a beamlet is determined by taking either the default length or the length specified by `beamlet-max-length-proportion`, whichever is smaller.

`beamlet-max-length-proportion` (pair):
`'(0.75 . 0.75)`

The maximum length of a beamlet, as a proportion of the distance between two adjacent stems.

`default-direction` (direction):
`ly:stem::calc-default-direction`

Direction determined by note head positions.

`details` (list):
`'((lengths 3.5 3.5 3.5 4.5 5.0 6.0) (beamed-lengths 3.26 3.5 3.6) (beamed-minimum-free-lengths 1.83 1.5 1.25) (beamed-extreme-minimum-free-lengths 2.0 1.25) (stem-shorten 1.0 0.5))`

Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction):
`ly:stem::calc-direction`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`duration-log` (integer):
`stem::calc-duration-log`

The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`flag` (stencil):
`ly:stem::calc-flag`

A function returning the full flag stencil for the `Stem`, which is passed to the function as the only argument. The default ly:stem::calc-stencil function uses the `flag-style` property to determine the correct glyph for the flag. By providing your own function, you can create arbitrary flags.

`length` (dimension, in staff space):
`ly:stem::calc-length`

User override for the stem length of unbeamed stems.

`neutral-direction` (direction):
`-1`

Which direction to take in the center of the staff.

`stem-end-position` (number):
`ly:stem::calc-stem-end-position`
Where does the stem end (the end is opposite to the support-head)?

`stencil` (stencil):
`ly:stem::print`
The symbol to print.

`thickness` (number):
`1.3`
Line thickness, generally measured in `line-thickness`.

`X-extent` (pair of numbers):
`ly:stem::width`
Hard coded extent in X direction.

`X-offset` (number):
`ly:stem::offset-callback`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
`ly:stem::height`
Hard coded extent in Y direction.

`Y-offset` (number):
`ly:staff-symbol-referencer::callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.102 [stem-interface], page 432.

### 3.1.100 StemTremolo

StemTremolo objects are created by: Section 2.2.107 [Stem_engraver], page 251.

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.

`slope` (number):
`ly:stem-tremolo::calc-slope`
The slope of this object.

`stencil` (stencil):
`ly:stem-tremolo::print`
The symbol to print.

`style` (symbol):
`ly:stem-tremolo::calc-style`
This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`X-extent` (pair of numbers):
`ly:stem-tremolo::width`
Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:stem-tremolo::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.103 [stem-tremolo-interface], page 434.

### 3.1.101 StringNumber

StringNumber objects are created by: Section 2.2.66 [New_fingering_engraver], page 240.

Standard settings:

`avoid-slur` (symbol):
`'around`
Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

`font-encoding` (symbol):
`'fetaText`
The font encoding is the broadest category for selecting a font. Currently, only lilypond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`font-size` (number):
`-5`
The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.5`
Add this much extra space between objects that are next to each other.

`script-priority` (number):
`100`
A sorting key that determines in what order a script is within a stack of scripts.

`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.

`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*.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423, Section 3.2.104 [string-number-interface], page 434, Section 3.2.110 [text-interface], page 436 and Section 3.2.111 [text-script-interface], page 437.

### 3.1.102 StrokeFinger

StrokeFinger objects are created by: Section 2.2.66 [New_fingering_engraver], page 240.

Standard settings:

`digit-names` (vector):
`#(p i m a x)`
Names for string finger digits.

`font-shape` (symbol):
`'italic`
Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number):
`-4`
The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.5`
Add this much extra space between objects that are next to each other.

`script-priority` (number):
`100`
A sorting key that determines in what order a script is within a stack of scripts.

`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.

`self-alignment-Y` (number):
`0`
Like `self-alignment-X` but for the Y axis.

`staff-padding` (dimension, in staff space):
`0.5`
Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`text` (markup):
`stroke-finger::calc-text`
Text markup. See Section "Formatting text" in *Notation Reference*.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423, Section 3.2.105 [stroke-finger-interface], page 435, Section 3.2.110 [text-interface], page 436 and Section 3.2.111 [text-script-interface], page 437.

### 3.1.103 SustainPedal

SustainPedal objects are created by: Section 2.2.81 [Piano_pedal_engraver], page 245.

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)`.

`padding` (dimension, in staff space):
`0.0`
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.

`stencil` (stencil):
`ly:sustain-pedal::print`
The symbol to print.

`X-offset` (number):
`ly:self-alignment-interface::x-aligned-on-self`
The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.76 [piano-pedal-interface], page 418, Section 3.2.77 [piano-pedal-script-interface], page 418, Section 3.2.85 [self-alignment-interface], page 421 and Section 3.2.110 [text-interface], page 436.

### 3.1.104 SustainPedalLineSpanner

SustainPedalLineSpanner objects are created by: Section 2.2.80 [Piano_pedal_align_engraver], page 244.

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.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`
Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`
Hard coded extent in Y direction.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.39 [grob-interface], page 397, Section 3.2.76 [piano-pedal-interface], page 418, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.105 System

System objects are not created by any engraver.

Standard settings:

`axes` (list):
`'(0 1)`
List of axis numbers. In the case of alignment grobs, this should contain only one number.

`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`
Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:system::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.39 [grob-interface], page 397, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.106 [system-interface], page 435.

### 3.1.106 SystemStartBar

SystemStartBar objects are created by: Section 2.2.108 [System_start_delimiter_engraver], page 252.

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`
Line thickness, generally measured in `line-thickness`.

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers)
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.107 [system-start-delimiter-interface], page 435.

### 3.1.107 SystemStartBrace

SystemStartBrace objects are created by: Section 2.2.108 [System_start_delimiter_engraver], page 252.

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.

`Y-extent` (pair of numbers)
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.107 [system-start-delimiter-interface], page 435.

### 3.1.108 SystemStartBracket

SystemStartBracket objects are created by: Section 2.2.108 [System_start_delimiter_engraver], page 252.

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`
Line thickness, generally measured in `line-thickness`.

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers)
: Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.107 [system-start-delimiter-interface], page 435.

### 3.1.109 SystemStartSquare

SystemStartSquare objects are created by: Section 2.2.108 [System_start_delimiter_engraver], page 252.

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`.

`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`

  Line thickness, generally measured in `line-thickness`.

`X-offset` (number):
: `ly:side-position-interface::x-aligned-side`

  The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers)
: Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.107 [system-start-delimiter-interface], page 435.

### 3.1.110 TabNoteHead

TabNoteHead objects are created by: Section 2.2.110 [Tab_note_heads_engraver], page 252.

Standard settings:

`details` (list):
: `'((tied-properties (break-visibility . #(#f #f #t)) (parenthesize . #t)) (repeat-tied-properties (note-head-visible . #t) (parenthesize . #t)))`

Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction):
`0`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`duration-log` (integer):
`note-head::calc-duration-log`

The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`font-series` (symbol):
`'bold`

Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`font-size` (number):
`-2`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`stem-attachment` (pair of numbers):
`'(0.0 . 1.35)`

An `(x . y)` pair where the stem attaches to the notehead.

`stencil` (stencil):
`ly:text-interface::print`

The symbol to print.

`whiteout` (boolean):
`#t`

If true, the grob is printed over a white background to white-out underlying material, if the grob is visible. Usually #f by default.

`X-offset` (number):
`ly:self-alignment-interface::x-aligned-on-self`

The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:staff-symbol-referencer::callback`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.66 [note-head-interface], page 413, Section 3.2.81 [rhythmic-grob-interface], page 419, Section 3.2.82 [rhythmic-head-interface], page 419, Section 3.2.100 [staff-symbol-referencer-interface], page 431, Section 3.2.109 [tab-note-head-interface], page 436 and Section 3.2.110 [text-interface], page 436.

### 3.1.111 TextScript

TextScript objects are created by: Section 2.2.113 [Text_engraver], page 254.

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-priority` (number):
`450`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`script-priority` (number):
`200`

A sorting key that determines in what order a script is within a stack of scripts.

`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.

`X-offset` (number):
`ly:self-alignment-interface::x-aligned-on-self`
The horizontal amount that this object is moved relative to its X-parent.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.43 [instrument-specific-markup-interface], page 402, Section 3.2.44 [item-interface], page 404, Section 3.2.85 [self-alignment-interface], page 421, Section 3.2.89 [side-position-interface], page 423, Section 3.2.110 [text-interface], page 436 and Section 3.2.111 [text-script-interface], page 437.

### 3.1.112 TextSpanner

TextSpanner objects are created by: Section 2.2.114 [Text_spanner_engraver], page 254.

Standard settings:

`bound-details` (list):
`'((left (Y . 0) (padding . 0.25) (attach-dir . -1)) (left-broken (end-on-note . #t)) (right (Y . 0) (padding . 0.25)))`
An alist of properties for determining attachments of spanners to edges.

`dash-fraction` (number):
`0.2`
Size of the dashes, relative to `dash-period`. Should be between `0.0` (no line) and `1.0` (continuous line).

`dash-period` (number):
`3.0`
The length of one dash together with whitespace. If negative, no line is drawn at all.

`direction` (direction):
`1`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`font-shape` (symbol):
`'italic`
Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`left-bound-info` (list):
`ly:line-spanner::calc-left-bound-info`
An alist of properties for determining attachments of spanners to edges.

`outside-staff-priority` (number):
`350`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`right-bound-info` (list):
`ly:line-spanner::calc-right-bound-info`

An alist of properties for determining attachments of spanners to edges.

`side-axis` (number):
`1`

If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`staff-padding` (dimension, in staff space):
`0.8`

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

`stencil` (stencil):
`ly:line-spanner::print`

The symbol to print.

`style` (symbol):
`'dashed-line`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.51 [line-interface], page 407, Section 3.2.52 [line-spanner-interface], page 408, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.113 Tie

Tie objects are created by: Section 2.2.19 [Completion_heads_engraver], page 225 and Section 2.2.115 [Tie_engraver], page 254.

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):
`ly:tie::calc-control-points`
List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

`details` (list):
`'((ratio . 0.333) (center-staff-line-clearance . 0.6) (tip-staff-line-clearance . 0.45) (note-head-gap . 0.2) (stem-gap . 0.35) (height-limit . 1.0) (horizontal-distance-penalty-factor . 10) (same-dir-as-stem-penalty . 8) (min-length-penalty-factor . 26) (tie-tie-collision-distance . 0.45) (tie-tie-collision-penalty . 25.0) (intra-space-threshold . 1.25) (outer-tie-vertical-distance-symmetry-penalty-factor . 10) (outer-tie-length-symmetry-penalty-factor . 10) (vertical-distance-penalty-factor . 7) (outer-tie-vertical-gap . 0.25) (multi-tie-region-size . 3) (single-tie-region-size . 4) (between-length-limit . 1.0))`
Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction):
`ly:tie::calc-direction`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`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. Fractional values are allowed.

`line-thickness` (number):
`0.8`
The thickness of the tie or slur contour.

`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`
Line thickness, generally measured in `line-thickness`.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.113 [tie-interface], page 438.

### 3.1.114 TieColumn

TieColumn objects are created by: Section 2.2.115 [Tie_engraver], page 254.

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)
Hard coded extent in X direction.

`Y-extent` (pair of numbers)
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.112 [tie-column-interface], page 438.

### 3.1.115 TimeSignature

TimeSignature objects are created by: Section 2.2.117 [Time_signature_engraver], page 255.

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 break-align grob 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 and spacing breakable items.

`break-visibility` (vector):
`#(#t #t #t)`

A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`extra-spacing-height` (pair of numbers):
`'(-1.0 . 1.0)`

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)`.

`non-musical` (boolean):
`#t`

True if the grob belongs to a `NonMusicalPaperColumn`.

`space-alist` (list):
`'((first-note fixed-space . 2.0) (right-edge extra-space . 0.5) (staff-bar minimum-space . 2.0))`

A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(break-align-symbol type . distance)`, where *type* can be the symbols `minimum-space` or `extra-space`.

`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.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 387, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404 and Section 3.2.114 [time-signature-interface], page 439.

### 3.1.116 TrillPitchAccidental

TrillPitchAccidental objects are created by: Section 2.2.84 [Pitched_trill_engraver], page 246.

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. Fractional values are allowed.

`glyph-name-alist` (list):
`'((0 . accidentals.natural) (-1/2 . accidentals.flat) (1/2 . accidentals.sharp) (1 . accidentals.doublesharp) (-1 .`

```
accidentals.flatflat) (3/4 . accidentals.sharp.slashslash.stemstemstem)
(1/4 . accidentals.sharp.slashslash.stem)
(-1/4 . accidentals.mirroredflat) (-3/4 .
accidentals.mirroredflat.flat))
```

An alist of key-string pairs.

`padding` (dimension, in staff space):

`0.2`

Add this much extra space between objects that are next to each other.

`side-axis` (number):

`0`

If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`stencil` (stencil):

`ly:accidental-interface::print`

The symbol to print.

`X-offset` (number):

`ly:side-position-interface::x-aligned-side`

The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):

`ly:accidental-interface::height`

Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.1 [accidental-interface], page 378, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.115 [trill-pitch-accidental-interface], page 440.

### 3.1.117 TrillPitchGroup

TrillPitchGroup objects are created by: Section 2.2.84 [Pitched_trill_engraver], page 246.

Standard settings:

`axes` (list):

`'(0)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction` (direction):

`1`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`font-size` (number):

`-4`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`padding` (dimension, in staff space):
`0.3`
Add this much extra space between objects that are next to each other.

`side-axis` (number):
`0`
If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`stencil` (stencil):
`parenthesize-elements`
The symbol to print.

`stencils` (list):
`parentheses-item::calc-parenthesis-stencils`
Multiple stencils, used as intermediate value.

`X-offset` (number):
`ly:side-position-interface::x-aligned-side`
The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.66 [note-head-interface], page 413, Section 3.2.72 [parentheses-interface], page 416 and Section 3.2.89 [side-position-interface], page 423.

### 3.1.118 TrillPitchHead

TrillPitchHead objects are created by: Section 2.2.84 [Pitched_trill_engraver], page 246.

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. Fractional values are allowed.

`stencil` (stencil):
`ly:note-head::print`
The symbol to print.

`Y-offset` (number):
`ly:staff-symbol-referencer::callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.48 [ledgered-interface], page 407, Section 3.2.78 [pitched-trill-interface], page 418, Section 3.2.82 [rhythmic-head-interface], page 419 and Section 3.2.100 [staff-symbol-referencer-interface], page 431.

### 3.1.119 TrillSpanner

TrillSpanner objects are created by: Section 2.2.121 [Trill_spanner_engraver], page 256.

Standard settings:

`after-line-breaking` (boolean):
`ly:spanner::kill-zero-spanned-time`

Dummy property, used to trigger callback for `after-line-breaking`.

`bound-details` (list):
`'((left (text #<procedure musicglyph-markup (layout props glyph-name)> scripts.trill) (Y . 0) (stencil-offset -0.5 . -1) (padding . 0.5) (attach-dir . 0)) (left-broken (end-on-note . #t)) (right (Y . 0)))`

An alist of properties for determining attachments of spanners to edges.

`direction` (direction):
`1`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`left-bound-info` (list):
`ly:line-spanner::calc-left-bound-info`

An alist of properties for determining attachments of spanners to edges.

`outside-staff-priority` (number):
`50`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`padding` (dimension, in staff space):
`0.5`

Add this much extra space between objects that are next to each other.

`right-bound-info` (list):
`ly:line-spanner::calc-right-bound-info`

An alist of properties for determining attachments of spanners to edges.

`side-axis` (number):
`1`

If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`staff-padding` (dimension, in staff space):
`1.0`

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

`stencil` (stencil):
`ly:line-spanner::print`

The symbol to print.

`style` (symbol):
`'trill`

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.51 [line-interface], page 407, Section 3.2.52 [line-spanner-interface], page 408, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.116 [trill-spanner-interface], page 440.

### 3.1.120 TupletBracket

TupletBracket objects are created by: Section 2.2.122 [Tuplet_engraver], page 256.

Standard settings:

`connect-to-neighbor` (pair):
`ly:tuplet-bracket::calc-connect-to-neighbors`

Pair of booleans, indicating whether this grob looks as a continued break.

`control-points` (list):
`ly:tuplet-bracket::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.

`direction` (direction):
`ly:tuplet-bracket::calc-direction`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`edge-height` (pair):
`'(0.7 . 0.7)`

A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`full-length-to-extent` (boolean):
`#t`

Run to the extent of the column for a full-length tuplet bracket.

`padding` (dimension, in staff space):
`1.1`

Add this much extra space between objects that are next to each other.

`positions` (pair of numbers):
`ly:tuplet-bracket::calc-positions`

Pair of staff coordinates `(`*`left . right`*`)`, where both *left* and *right* are in `staff-space` units of the current staff. For slurs, this value selects

which slur candidate to use; if extreme positions are requested, the closest one is taken.

`shorten-pair` (pair of numbers):
`'(-0.2 . -0.2)`

The lengths to shorten a text-spanner on both sides, for example a pedal bracket. Positive values shorten the 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`

Line thickness, generally measured in `line-thickness`.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.51 [line-interface], page 407, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.117 [tuplet-bracket-interface], page 440.

### 3.1.121 TupletNumber

TupletNumber objects are created by: Section 2.2.122 [Tuplet_engraver], page 256.

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`.

`font-shape` (symbol):
`'italic`

Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number):
`-2`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`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*.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.96 [spanner-interface], page 429, Section 3.2.110 [text-interface], page 436 and Section 3.2.118 [tuplet-number-interface], page 441.

### 3.1.122 UnaCordaPedal

UnaCordaPedal objects are created by: Section 2.2.81 [Piano_pedal_engraver], page 245.

Standard settings:

`direction` (direction):
`1`
If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`extra-spacing-width` (pair of numbers):
`'(+inf.0 . -inf.0)`
In the horizontal spacing problem, we pad each item by this amount (by adding the 'car' on the left side of the item and adding the 'cdr' on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

`font-shape` (symbol):
`'italic`
Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`padding` (dimension, in staff space):
`0.0`
Add this much extra space between objects that are next to each other.

`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.

`stencil` (stencil):
`ly:text-interface::print`
The symbol to print.

`X-offset` (number):
`ly:self-alignment-interface::x-aligned-on-self`
The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.44 [item-interface], page 404, Section 3.2.77 [piano-pedal-script-interface], page 418, Section 3.2.85 [self-alignment-interface], page 421 and Section 3.2.110 [text-interface], page 436.

### 3.1.123 UnaCordaPedalLineSpanner

UnaCordaPedalLineSpanner objects are created by: Section 2.2.80 [Piano_pedal_align_engraver], page 244.

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.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`

Hard coded extent in Y direction.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.39 [grob-interface], page 397, Section 3.2.76 [piano-pedal-interface], page 418, Section 3.2.89 [side-position-interface], page 423 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.124 VaticanaLigature

VaticanaLigature objects are created by: Section 2.2.124 [Vaticana_ligature_engraver], page 257.

Standard settings:

`stencil` (stencil):
`ly:vaticana-ligature::print`
The symbol to print.

`thickness` (number):
`0.6`
Line thickness, generally measured in `line-thickness`.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.120 [vaticana-ligature-interface], page 442.

### 3.1.125 VerticalAlignment

VerticalAlignment objects are created by: Section 2.2.125 [Vertical_align_engraver], page 257.

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`
Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.4 [align-interface], page 379, Section 3.2.7 [axis-group-interface], page 380, Section 3.2.39 [grob-interface], page 397 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.126 VerticalAxisGroup

VerticalAxisGroup objects are created by: Section 2.2.5 [Axis_group_engraver], page 220 and Section 2.2.46 [Hara_kiri_engraver], page 233.

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):
`'((space . 9) (minimum-distance . 8) (padding . 1))`

The settings to use for `staff-staff-spacing` when it is unset, for ungrouped staves and for grouped staves that do not have the relevant `StaffGrouper` property set (`staff-staff-spacing` or `staffgroup-staff-spacing`).

`nonstaff-unrelatedstaff-spacing` (list):
`'((padding . 0.5))`

The spacing alist controlling the distance between the current non-staff line and the nearest staff in the opposite direction from `staff-affinity`, if there are no other non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. See `staff-staff-spacing` for a description of the alist structure.

`staff-staff-spacing` (list):
`ly:axis-group-interface::calc-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:

- `padding` – the minimum required amount of unobstructed vertical whitespace between the two items, measured in staff-spaces.
- `space` – 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.
- `stretchability` – a unitless measure of the dimension's relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result).

`stencil` (stencil):
`ly:axis-group-interface::print`

The symbol to print.

`vertical-skylines` (pair of skylines):
`ly:hara-kiri-group-spanner::calc-skylines`

Two skylines, one above and one below this grob.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:hara-kiri-group-spanner::y-extent`
Hard coded extent in Y direction.

`Y-offset` (number):
`ly:hara-kiri-group-spanner::force-hara-kiri-callback`
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.39 [grob-interface], page 397, Section 3.2.41 [hara-kiri-group-spanner-interface], page 401 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.127 VoiceFollower

VoiceFollower objects are created by: Section 2.2.67 [Note_head_line_engraver], page 240.

Standard settings:

`after-line-breaking` (boolean):
`ly:spanner::kill-zero-spanned-time`
Dummy property, used to trigger callback for `after-line-breaking`.

`bound-details` (list):
`'((right (attach-dir . 0) (padding . 1.5)) (left (attach-dir . 0) (padding . 1.5)))`
An alist of properties for determining attachments of spanners to edges.

`gap` (dimension, in staff space):
`0.5`
Size of a gap in a variable symbol.

`left-bound-info` (list):
`ly:line-spanner::calc-left-bound-info`
An alist of properties for determining attachments of spanners to edges.

`non-musical` (boolean):
`#t`
True if the grob belongs to a `NonMusicalPaperColumn`.

`right-bound-info` (list):
`ly:line-spanner::calc-right-bound-info`
An alist of properties for determining attachments of spanners to edges.

`stencil` (stencil):
`ly:line-spanner::print`
The symbol to print.

`style` (symbol):
`'line`
This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`X-extent` (pair of numbers)
Hard coded extent in X direction.

`Y-extent` (pair of numbers)
Hard coded extent in Y direction.

This object supports the following interface(s): Section 3.2.39 [grob-interface], page 397, Section 3.2.51 [line-interface], page 407, Section 3.2.52 [line-spanner-interface], page 408 and Section 3.2.96 [spanner-interface], page 429.

### 3.1.128 VoltaBracket

VoltaBracket objects are created by: Section 2.2.126 [Volta_engraver], page 257.

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`.

`edge-height` (pair):
`'(2.0 . 2.0)`

A pair of numbers specifying the heights of the vertical edges: `(`*`left-height . right-height`*`)`.

`font-encoding` (symbol):
`'fetaText`

The font encoding is the broadest category for selecting a font. Currently, only lilypond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`font-size` (number):
`-4`

The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`stencil` (stencil):
`ly:volta-bracket-interface::print`

The symbol to print.

`thickness` (number):
`1.6`

Line thickness, generally measured in `line-thickness`.

`word-space` (dimension, in staff space):
`0.6`

Space to insert between words in texts.

This object supports the following interface(s): Section 3.2.33 [font-interface], page 393, Section 3.2.39 [grob-interface], page 397, Section 3.2.42 [horizontal-bracket-interface], page 402, Section 3.2.51 [line-interface], page 407, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429, Section 3.2.110 [text-interface], page 436, Section 3.2.121 [volta-bracket-interface], page 442 and Section 3.2.122 [volta-interface], page 443.

### 3.1.129 VoltaBracketSpanner

VoltaBracketSpanner objects are created by: Section 2.2.126 [Volta_engraver], page 257.

Standard settings:

`after-line-breaking` (boolean):
`ly:side-position-interface::move-to-extremal-staff`

Dummy property, used to trigger callback for `after-line-breaking`.

`axes` (list):
`'(1)`

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction` (direction):
`1`

If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP`=`1`, `#DOWN`=`-1`, `#LEFT`=`-1`, `#RIGHT`=`1`, `#CENTER`=`0`.

`no-alignment` (boolean):
`#t`

If set, don't place this grob in a `VerticalAlignment`; rather, place it using its own `Y-offset` callback.

`outside-staff-priority` (number):
`600`

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`padding` (dimension, in staff space):
`1`

Add this much extra space between objects that are next to each other.

`side-axis` (number):
`1`

If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`X-extent` (pair of numbers):
`ly:axis-group-interface::width`

Hard coded extent in X direction.

`Y-extent` (pair of numbers):
`ly:axis-group-interface::height`

Hard coded extent in Y direction.

`Y-offset` (number):
`ly:side-position-interface::y-aligned-side`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 380, Section 3.2.39 [grob-interface], page 397, Section 3.2.89 [side-position-interface], page 423, Section 3.2.96 [spanner-interface], page 429 and Section 3.2.122 [volta-interface], page 443.

## 3.2 Graphical Object Interfaces

### 3.2.1 accidental-interface

A single accidental.

#### User settable properties:

`alteration` (number)
: Alteration numbers for accidental.

`avoid-slur` (symbol)
: Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

`glyph-name-alist` (list)
: An alist of key-string pairs.

`hide-tied-accidental-after-break` (boolean)
: If set, an accidental that appears on a tied note after a line break will not be displayed.

`parenthesized` (boolean)
: Parenthesize this grob.

`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): Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.4 [AccidentalSuggestion], page 272, Section 3.1.6 [AmbitusAccidental], page 274 and Section 3.1.116 [TrillPitchAccidental], page 365.

### 3.2.2 accidental-placement-interface

Resolve accidental collisions.

#### User settable properties:

`direction` (direction)
: If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`right-padding` (dimension, in staff space)
: Space to insert on the right side of an object (e.g., between note and its accidentals).

`script-priority` (number)
: A sorting key that determines in what order a script is within a stack of scripts.

### Internal properties:

`accidental-grobs` (list)
: An alist with `(`*`notename . groblist`*`)` entries.

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.3 [AccidentalPlacement], page 271.

## 3.2.3 accidental-suggestion-interface

An accidental, printed as a suggestion (typically: vertically over a note).

This grob interface is used in the following graphical object(s): Section 3.1.4 [AccidentalSuggestion], page 272.

## 3.2.4 align-interface

Order grobs from top to bottom, left to right, right to left or bottom to top. For vertical alignments of staves, the `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.

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.14 [BassFigureAlignment], page 281 and Section 3.1.125 [VerticalAlignment], page 373.

### 3.2.5 ambitus-interface

The line between note heads for a pitch range.

#### User settable properties:

`gap` (dimension, in staff space)
: Size of a gap in a variable symbol.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

#### Internal properties:

`note-heads` (array of grobs)
: An array of note head grobs.

This grob interface is used in the following graphical object(s): Section 3.1.5 [Ambitus], page 273, Section 3.1.7 [AmbitusLine], page 275 and Section 3.1.8 [AmbitusNoteHead], page 275.

### 3.2.6 arpeggio-interface

Functions and settings for drawing an arpeggio symbol.

#### User settable properties:

`arpeggio-direction` (direction)
: If set, put an arrow on the arpeggio squiggly line.

`positions` (pair of numbers)
: Pair of staff coordinates `(left . right)`, where both *left* and *right* are in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`script-priority` (number)
: A sorting key that determines in what order a script is within a stack of scripts.

`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`.

#### Internal properties:

`stems` (array of grobs)
: An array of stem objects.

This grob interface is used in the following graphical object(s): Section 3.1.9 [Arpeggio], page 276.

### 3.2.7 axis-group-interface

An object that groups other layout objects.

#### User settable properties:

`axes` (list) List of axis numbers. In the case of alignment grobs, this should contain only one number.

`default-staff-staff-spacing` (list)
: The settings to use for `staff-staff-spacing` when it is unset, for ungrouped staves and for grouped staves that do not have the relevant `StaffGrouper` property set (`staff-staff-spacing` or `staffgroup-staff-spacing`).

`max-stretch` (number)
: The maximum amount that this `VerticalAxisGroup` can be vertically stretched (for example, in order to better fill a page).

`no-alignment` (boolean)
: If set, don't place this grob in a `VerticalAlignment`; rather, place it using its own `Y-offset` callback.

`nonstaff-nonstaff-spacing` (list)
: The spacing alist controlling the distance between the current non-staff line and the next non-staff line in the direction of `staff-affinity`, if both are on the same side of the related staff, and `staff-affinity` is either `UP` or `DOWN`. See `staff-staff-spacing` for a description of the alist structure.

`nonstaff-relatedstaff-spacing` (list)
: The spacing alist controlling the distance between the current non-staff line and the nearest staff in the direction of `staff-affinity`, if there are no non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. If `staff-affinity` is `CENTER`, then `nonstaff-relatedstaff-spacing` is used for the nearest staves on *both* sides, even if other non-staff lines appear between the current one and either of the staves. See `staff-staff-spacing` for a description of the alist structure.

`nonstaff-unrelatedstaff-spacing` (list)
: The spacing alist controlling the distance between the current non-staff line and the nearest staff in the opposite direction from `staff-affinity`, if there are no other non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. See `staff-staff-spacing` for a description of the alist structure.

`staff-affinity` (direction)
: The direction of the staff to use for spacing the current non-staff line. Choices are `UP`, `DOWN`, and `CENTER`. If `CENTER`, the non-staff line will be placed equidistant between the two nearest staves on either side, unless collisions or other spacing constraints prevent this. Setting `staff-affinity` for a staff causes it to be treated as a non-staff line. Setting `staff-affinity` to `#f` causes a non-staff line to be treated as a staff.

`staff-staff-spacing` (list)
: When applied to a staff-group's `StaffGrouper` grob, this spacing alist controls the distance between consecutive staves within the staff-group. When applied to a staff's `VerticalAxisGroup` grob, it controls the distance between the staff and the nearest staff below it in the same system, replacing any settings inherited from the `StaffGrouper` grob of the containing staff-group, if there is one. This property remains in effect even when non-staff lines appear between staves. The alist can contain the following keys:

  - `padding` – the minimum required amount of unobstructed vertical whitespace between the two items, measured in staff-spaces.

- `space` – 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.
- `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)
: Two skylines, one above and one below this grob.

## Internal properties:

`adjacent-pure-heights` (pair)
: A pair of vectors. Used by a `VerticalAxisGroup` to cache the `Y-extent`s of different column ranges.

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

`pure-relevant-grobs` (array of grobs)
: All the grobs (items and spanners) that are relevant for finding the `pure-Y-extent`

`pure-relevant-items` (array of grobs)
: A subset of elements that are relevant for finding the `pure-Y-extent`.

`pure-relevant-spanners` (array of grobs)
: A subset of elements that are relevant for finding the `pure-Y-extent`.

`pure-Y-common` (graphical (layout) object)
: A cache of the `common_refpoint_of_array` of the `elements` grob set.

`staff-grouper` (graphical (layout) object)
: The staff grouper we belong to.

`system-Y-offset` (number)
: The Y-offset (relative to the bottom of the top-margin of the page) of the system to which this staff belongs.

`X-common` (graphical (layout) object)
: Common reference point for axis group.

`Y-common` (graphical (layout) object)
: See `X-common`.

This grob interface is used in the following graphical object(s): Section 3.1.5 [Ambitus], page 273, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.15 [BassFigureAlignmentPositioning], page 281, Section 3.1.18 [BassFigureLine], page 283, Section 3.1.21 [BreakAlignGroup], page 285, Section 3.1.22 [BreakAlignment], page 286, Section 3.1.30 [DotColumn], page 292, Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.67 [NonMusicalPaperColumn], page 324, Section 3.1.68 [NoteCollision], page 325, Section 3.1.69 [NoteColumn], page 326, Section 3.1.75 [PaperColumn], page 330, Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.104 [SustainPedalLineSpanner], page 354, Section 3.1.105 [System], page 355, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.123 [UnaCordaPedalLineSpanner], page 372, Section 3.1.125 [VerticalAlignment], page 373, Section 3.1.126 [VerticalAxisGroup], page 373 and Section 3.1.129 [VoltaBracketSpanner], page 376.

### 3.2.8 balloon-interface

A collection of routines to put text balloons around an object.

#### User settable properties:

`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*.

This grob interface is used in the following graphical object(s): Section 3.1.10 [BalloonTextItem], page 277.

### 3.2.9 bar-line-interface

Bar line.

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. Options are `|`, `:|`, `|:`, `:|:`, `:|.|:`, `:|.:|`, `.`, `||`, `|.`, `.|`, `.|.`, `|.|`, `:`, `dashed`, `'` and `S`.

These produce, respectively, a normal bar line, a right repeat, a left repeat, a thick double repeat, a thin-thick-thin double repeat, a thin-thick double repeat, a thick bar, a double bar, a start bar, an end bar, a thick double bar, a thin-thick-thin bar, a dotted bar, a dashed bar, a tick as bar line and a segno bar.

In addition, there is an option `||:` which is equivalent to `|:` except at line breaks, where it produces a double bar (`||`) at the end of the line and a repeat sign (`|:`) at the beginning of the new line.

For segno, `S` produces a segno sign except at line breaks, where it produces a double bar (`||`) at the end of the line and a segno sign at the beginning of the new line. `|S` is equivalent to `S` but produces a simple bar line (`|`) instead of a double bar line (`||`) at line breaks. `S|` produces the segno sign at line breaks and starts the following line without special bar lines.

`S|:` and `:|S` are used for repeat/segno combinations that are separated at line breaks. Alternatively, `.S|:` and `:|S.` may be used which combine repeat signs and segno at the same line in case of a line break. `:|S|:` is a combination of a left repeat (`:|`), a segno (`S`) and a right repeat `|:` which splits before the segno at line breaks; `:|S.|:` splits after the segno sign.

If *bartype* is set to `empty` then nothing is printed, but a line break is allowed at that spot.

`gap` is used for the gaps in dashed bar lines.

#### User settable properties:

`allow-span-bar` (boolean)
: If false, no inter-staff bar line will be created below this bar line.

`gap` (dimension, in staff space)
: Size of a gap in a variable symbol.

`kern` (dimension, in staff space)
: Amount of extra white space to add. For bar lines, this is the amount of space after a thick line.

`thin-kern` (number)
: The space after a hair-line in a bar line.

`hair-thickness` (number)
: Thickness of the thin line in a bar line.

`thick-thickness` (number)
: Bar line thickness, measured in `line-thickness`.

`glyph` (string)
: A string determining what 'style' of glyph is typeset. Valid choices depend on the function that is reading this property.

`glyph-name` (string)
: The glyph name within the font.

`bar-size` (dimension, in staff space)
: The size of a bar line.

### Internal properties:

`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.

This grob interface is used in the following graphical object(s): Section 3.1.11 [BarLine], page 277 and Section 3.1.94 [SpanBar], page 345.

## 3.2.10 bass-figure-alignment-interface

Align a bass figure.

This grob interface is used in the following graphical object(s): Section 3.1.14 [BassFigureAlignment], page 281.

## 3.2.11 bass-figure-interface

A bass figure text.

### User settable properties:

`implicit` (boolean)
: Is this an implicit bass figure?

This grob interface is used in the following graphical object(s): Section 3.1.13 [BassFigure], page 281.

## 3.2.12 beam-interface

A beam.

The `beam-thickness` property is the weight of beams, measured in staffspace. The `direction` property is not user-serviceable. Use the `direction` property of `Stem` instead.

The following properties may be set in the `details` list.

`stem-length-demerit-factor`
: Demerit factor used for inappropriate stem lengths.

`secondary-beam-demerit`
: Demerit used in quanting calculations for multiple beams.

`region-size`
: Size of region for checking quant scores.

`beam-eps` Epsilon for beam quant code to check for presence in gap.

`stem-length-limit-penalty`
: Penalty for differences in stem lengths on a beam.

`damping-direction-penalty`
: Demerit penalty applied when beam direction is different from damping direction.

`hint-direction-penalty`
: Demerit penalty applied when beam direction is different from damping direction, but damping slope is <= `round-to-zero-slope`.

`musical-direction-factor`
: Demerit scaling factor for difference between beam slope and music slope.

`ideal-slope-factor`
: Demerit scaling factor for difference between beam slope and damping slope.

`round-to-zero-slope`
: Damping slope which is considered zero for purposes of calculating direction penalties.

## User settable properties:

`annotation` (string)
: Annotate a grob for debug purposes.

`auto-knee-gap` (dimension, in staff space)
: If a gap is found between note heads where a horizontal beam fits that is larger than this number, make a kneed beam.

`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.

`beam-thickness` (dimension, in staff space)
: Beam thickness, measured in `staff-space` units.

`break-overshoot` (pair of numbers)
: How much does a broken spanner stick out of its bounds?

`clip-edges` (boolean)
: Allow outward pointing beamlets at the edges of beams?

`concaveness` (number)
: A beam is concave if its inner stems are closer to the beam than the two outside stems. This number is a measure of the closeness of the inner stems. It is used for damping the slope of the beam.

`damping` (number)
: Amount of beam slope damping.

`details` (list)
: Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction)
: If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`gap` (dimension, in staff space)
: Size of a gap in a variable symbol.

`gap-count` (integer)
: Number of gapped beams for tremolo.

`grow-direction` (direction)
: Crescendo or decrescendo?

`inspect-quants` (pair of numbers)
: If debugging is set, set beam and slur quants to this position, and print the respective scores.

`knee` (boolean)
: Is this beam kneed?

`length-fraction` (number)
: Multiplier for lengths. Used for determining ledger lines and stem lengths.

`neutral-direction` (direction)
: Which direction to take in the center of the staff.

`positions` (pair of numbers)
: Pair of staff coordinates `(left . right)`, where both *left* and *right* are in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

## Internal properties:

`least-squares-dy` (number)
: The ideal beam slope, without damping.

`normal-stems` (array of grobs)
: An array of visible stems.

`quant-score` (string)
: The beam quanting score; stored for debugging.

`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): Section 3.1.19 [Beam], page 283.

### 3.2.13 bend-after-interface

A doit or drop.

#### User settable properties:

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

#### Internal properties:

`delta-position` (number)
: The vertical position difference.

This grob interface is used in the following graphical object(s): Section 3.1.20 [BendAfter], page 285.

### 3.2.14 break-alignable-interface

Object that is aligned on a break alignment.

#### User settable properties:

`break-align-symbols` (list)
: A list of symbols that determine which break-aligned grobs 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 `left-edge`, `ambitus`, `breathing-sign`, `clef`, `staff-bar`, `key-cancellation`, `key-signature`, `time-signature`, and `custos`.

`non-break-align-symbols` (list)
: A list of symbols that determine which NON-break-aligned interfaces to align this to.

This grob interface is used in the following graphical object(s): Section 3.1.12 [BarNumber], page 279, Section 3.1.63 [MetronomeMark], page 320 and Section 3.1.81 [RehearsalMark], page 335.

### 3.2.15 break-aligned-interface

Items that are aligned in prefatory matter.

The spacing of these items is controlled by the `space-alist` property. It contains a list `break-align-symbol`s with a specification of the associated space. The space specification can be

`(minimum-space . spc))`
: Pad space until the distance is *spc*.

`(fixed-space . spc)`
: Set a fixed space.

`(semi-fixed-space . spc)`
: Set a space. Half of it is fixed and half is stretchable. (does not work at start of line. fixme)

`(extra-space . spc)`
: Add *spc* amount of space.

Special keys for the alist are `first-note` and `next-note`, signifying the first note on a line, and the next note halfway a line.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

### User settable properties:

`break-align-anchor` (number)
: Grobs aligned to this break-align grob 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 and spacing breakable items.

`space-alist` (list)
: A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(`*`break-align-symbol type . distance`*`)`, where *type* can be the symbols `minimum-space` or `extra-space`.

This grob interface is used in the following graphical object(s): Section 3.1.5 [Ambitus], page 273, Section 3.1.6 [AmbitusAccidental], page 274, Section 3.1.11 [BarLine], page 277, Section 3.1.21 [BreakAlignGroup], page 285, Section 3.1.23 [BreathingSign], page 287, Section 3.1.25 [Clef], page 288, Section 3.1.29 [Custos], page 292, Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.49 [KeyCancellation], page 310, Section 3.1.50 [KeySignature], page 311, Section 3.1.54 [LeftEdge], page 314 and Section 3.1.115 [TimeSignature], page 364.

## 3.2.16 break-alignment-interface

The object that performs break alignment. See Section 3.2.15 [break-aligned-interface], page 387.

### User settable properties:

`break-align-orders` (vector)
: Defines the order in which prefatory matter (clefs, key signatures) appears. The format is a vector of length 3, where each element is one order for end-of-line, middle of line, and start-of-line, respectively. An order is a list of symbols.

  For example, clefs are put after key signatures by setting

```
\override Score.BreakAlignment #'break-align-orders =
  #(make-vector 3 '(span-bar
                    breathing-sign
                    staff-bar
                    key
                    clef
                    time-signature))
```

### Internal properties:

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.22 [BreakAlignment], page 286.

### 3.2.17 breathing-sign-interface

A breathing sign.

#### User settable properties:

`direction` (direction)
: If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

This grob interface is used in the following graphical object(s): Section 3.1.23 [BreathingSign], page 287.

### 3.2.18 chord-name-interface

A chord label (name or fretboard).

#### Internal properties:

`begin-of-line-visible` (boolean)
: Set to make `ChordName` or `FretBoard` be visible only at beginning of line or at chord changes.

This grob interface is used in the following graphical object(s): Section 3.1.24 [ChordName], page 287 and Section 3.1.39 [FretBoard], page 302.

### 3.2.19 clef-interface

A clef sign.

#### User settable properties:

`full-size-change` (boolean)
: Don't make a change clef smaller.

`glyph` (string)
: A string determining what 'style' of glyph is typeset. Valid choices depend on the function that is reading this property.

`glyph-name` (string)
: The glyph name within the font.

`non-default` (boolean)
: Set for manually specified clefs.

This grob interface is used in the following graphical object(s): Section 3.1.25 [Clef], page 288.

### 3.2.20 cluster-beacon-interface

A place holder for the cluster spanner to determine the vertical extents of a cluster spanner at this X position.

#### User settable properties:

`positions` (pair of numbers)
: Pair of staff coordinates `(left . right)`, where both *left* and *right* are in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

This grob interface is used in the following graphical object(s): Section 3.1.27 [ClusterSpannerBeacon], page 290.

### 3.2.21 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:

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

#### Internal properties:

`columns` (array of grobs)
: An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

This grob interface is used in the following graphical object(s): Section 3.1.26 [ClusterSpanner], page 289.

### 3.2.22 custos-interface

A custos object. `style` can have four valid values: `mensural`, `vaticana`, `medicaea`, and `hufnagel`. `mensural` is the default style.

#### User settable properties:

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`neutral-position` (number)
: Position (in half staff spaces) where to flip the direction of custos stem.

`neutral-direction` (direction)
: Which direction to take in the center of the staff.

This grob interface is used in the following graphical object(s): Section 3.1.29 [Custos], page 292.

### 3.2.23 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:

`direction` (direction)
: If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

### Internal properties:

`dots` (array of grobs)
: Multiple `Dots` objects.

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.30 [DotColumn], page 292.

## 3.2.24 dots-interface

The dots to go with a notehead or rest. `direction` sets the preferred direction to move in case of staff line collisions. `style` defaults to undefined, which is normal 19th/20th century traditional style. Set `style` to `vaticana` for ancient type dots.

### User settable properties:

`direction` (direction)
: If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`dot-count` (integer)
: The number of dots.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

This grob interface is used in the following graphical object(s): Section 3.1.31 [Dots], page 293.

## 3.2.25 dynamic-interface

Any kind of loudness sign.

This grob interface is used in the following graphical object(s): Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298 and Section 3.1.44 [Hairpin], page 305.

## 3.2.26 dynamic-line-spanner-interface

Dynamic line spanner.

### User settable properties:

`avoid-slur` (symbol)
: Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

This grob interface is used in the following graphical object(s): Section 3.1.34 [DynamicLineSpanner], page 296.

### 3.2.27 dynamic-text-interface

An absolute text dynamic.

#### User settable properties:

`right-padding` (dimension, in staff space)
: Space to insert on the right side of an object (e.g., between note and its accidentals).

This grob interface is used in the following graphical object(s): Section 3.1.35 [DynamicText], page 297.

### 3.2.28 dynamic-text-spanner-interface

Dynamic text spanner.

#### User settable properties:

`text` (markup)
: Text markup. See Section "Formatting text" in *Notation Reference*.

This grob interface is used in the following graphical object(s): Section 3.1.36 [DynamicTextSpanner], page 298.

### 3.2.29 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.

`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 a text-spanner on both sides, for example a pedal bracket. Positive values shorten the text-spanner, while negative values lengthen it.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

#### Internal properties:

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

This grob interface is used in the following graphical object(s): Section 3.1.16 [BassFigureBracket], page 282.

### 3.2.30 episema-interface

An episema line.

This grob interface is used in the following graphical object(s): Section 3.1.37 [Episema], page 299.

### 3.2.31 figured-bass-continuation-interface

Simple extender line between bounds.

#### User settable properties:

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

#### Internal properties:

`figures` (array of grobs)
: Figured bass objects for continuation line.

This grob interface is used in the following graphical object(s): Section 3.1.17 [BassFigureContinuation], page 282.

### 3.2.32 finger-interface

A fingering instruction.

This grob interface is used in the following graphical object(s): Section 3.1.38 [Fingering], page 300.

### 3.2.33 font-interface

Any symbol that is typeset through fixed sets of glyphs, (i.e., fonts).

#### User settable properties:

`font-encoding` (symbol)
: The font encoding is the broadest category for selecting a font. Currently, only lilypond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`font-family` (symbol)
: The font family is the broadest category for selecting text fonts. Options include: `sans`, `roman`.

`font-name` (string)
: Specifies a file name (without extension) of the font to load. This setting overrides selection using `font-family`, `font-series` and `font-shape`.

`font-series` (symbol)
: Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`font-shape` (symbol)
: Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number)
: The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

### Internal properties:

`font` (font metric)
: A cached font metric object.

This grob interface is used in the following graphical object(s): Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.4 [AccidentalSuggestion], page 272, Section 3.1.6 [AmbitusAccidental], page 274, Section 3.1.7 [AmbitusLine], page 275, Section 3.1.8 [AmbitusNoteHead], page 275, Section 3.1.9 [Arpeggio], page 276, Section 3.1.10 [BalloonTextItem], page 277, Section 3.1.11 [BarLine], page 277, Section 3.1.12 [BarNumber], page 279, Section 3.1.13 [BassFigure], page 281, Section 3.1.19 [Beam], page 283, Section 3.1.23 [BreathingSign], page 287, Section 3.1.24 [ChordName], page 287, Section 3.1.25 [Clef], page 288, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.29 [Custos], page 292, Section 3.1.31 [Dots], page 293, Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.37 [Episema], page 299, Section 3.1.38 [Fingering], page 300, Section 3.1.39 [FretBoard], page 302, Section 3.1.45 [HarmonicParenthesesItem], page 307, Section 3.1.47 [InstrumentName], page 308, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.49 [KeyCancellation], page 310, Section 3.1.50 [KeySignature], page 311, Section 3.1.57 [LyricHyphen], page 316, Section 3.1.59 [LyricText], page 317, Section 3.1.62 [MensuralLigature], page 319, Section 3.1.63 [MetronomeMark], page 320, Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.67 [NonMusicalPaperColumn], page 324, Section 3.1.70 [NoteHead], page 326, Section 3.1.71 [NoteName], page 327, Section 3.1.73 [OctavateEight], page 328, Section 3.1.74 [OttavaBracket], page 329, Section 3.1.75 [PaperColumn], page 330, Section 3.1.76 [ParenthesesItem], page 331, Section 3.1.77 [PercentRepeat], page 331, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.81 [RehearsalMark], page 335, Section 3.1.85 [Rest], page 339, Section 3.1.87 [Script], page 339, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.94 [SpanBar], page 345, Section 3.1.98 [StanzaNumber], page 348, Section 3.1.99 [Stem], page 348, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352, Section 3.1.103 [SustainPedal], page 353, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357, Section 3.1.109 [SystemStartSquare], page 358, Section 3.1.110 [TabNoteHead], page 358, Section 3.1.111 [TextScript], page 360, Section 3.1.112 [TextSpanner], page 361, Section 3.1.115 [TimeSignature], page 364, Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.118 [TrillPitchHead], page 367, Section 3.1.119 [TrillSpanner], page 368, Section 3.1.121 [TupletNumber], page 370, Section 3.1.122 [UnaCordaPedal], page 371, Section 3.1.124 [VaticanaLigature], page 373 and Section 3.1.128 [VoltaBracket], page 376.

## 3.2.34 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.

`fret-diagram-details` (list)

An alist of detailed grob properties for fret diagrams. Each alist entry consists of a (*property* . *value*) pair. The properties which can be included in `fret-diagram-details` include the following:

- `barre-type` – Type of barre indication used. Choices include `curved`, `straight`, and `none`. Default `curved`.
- `capo-thickness` – Thickness of capo indicator, in multiples of fret-space. Default value 0.5.
- `dot-color` – Color of dots. Options include `black` and `white`. Default `black`.
- `dot-label-font-mag` – Magnification for font used to label fret dots. Default value 1.
- `dot-position` – Location of dot in fret space. Default 0.6 for dots without labels, 0.95-`dot-radius` for dots with labels.
- `dot-radius` – Radius of dots, in terms of fret spaces. Default value 0.425 for labeled dots, 0.25 for unlabeled dots.
- `finger-code` – Code for the type of fingering indication used. Options include `none`, `in-dot`, and `below-string`. Default `none` for markup fret diagrams, `below-string` for `FretBoards` fret diagrams.
- `fret-count` – The number of frets. Default 4.
- `fret-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.
- `label-dir` – Side to which the fret label is attached. `-1`, `#LEFT`, or `#DOWN` for left or down; `1`, `#RIGHT`, or `#UP` for right or up. Default `#RIGHT`.
- `mute-string` – Character string to be used to indicate muted string. Default `"x"`.
- `number-type` – Type of numbers to use in fret label. Choices include `roman-lower`, `roman-upper`, and `arabic`. 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-label-font-mag` – The magnification of the font used to label fingerings at the string, rather than in the dot. Default value 0.6 for `normal` orientation, 0.5 for `landscape` and `opposing-landscape`.
- `string-thickness-factor` – Factor for changing thickness of each string in the fret diagram. Thickness of string $k$ is given by `thickness` * (1+`string-thickness-factor`) ^ ($k$-1). Default 0.
- `top-fret-thickness` – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.

- `xo-font-magnification` – Magnification used for mute and open string indicators. Default value 0.5.
- `xo-padding` – Padding for open and mute indicators from top fret. Default value 0.25.

`size` (number)
: Size of object, relative to standard size.

`dot-placement-list` (list)
: List consisting of `(`*`description string-number fret-number finger-number`*`)` entries used to define fret diagrams.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

This grob interface is used in the following graphical object(s): Section 3.1.39 [FretBoard], page 302.

### 3.2.35 grace-spacing-interface

Keep track of durations in a run of grace notes.

#### User settable properties:

`common-shortest-duration` (moment)
: The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

#### Internal properties:

`columns` (array of grobs)
: An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

This grob interface is used in the following graphical object(s): Section 3.1.41 [GraceSpacing], page 304.

### 3.2.36 gregorian-ligature-interface

A gregorian ligature.

#### Internal properties:

`virga` (boolean)
: Is this neume a virga?

`stropha` (boolean)
: Is this neume a stropha?

`inclinatum` (boolean)
: Is this neume an inclinatum?

`auctum` (boolean)
: Is this neume liquescentically augmented?

`descendens` (boolean)
: Is this neume of descendent type?

`ascendens` (boolean)
: Is this neume of ascending type?

`oriscus` (boolean)
: Is this neume an oriscus?

`quilisma` (boolean)
: Is this neume a quilisma?

`deminutum` (boolean)
: Is this neume deminished?

`cavum` (boolean)
: Is this neume outlined?

`linea` (boolean)
: Attach vertical lines to this neume?

`pes-or-flexa` (boolean)
: Shall this neume be joined with the previous head?

`context-info` (integer)
: Within a ligature, the final glyph or shape of a head may be affected by the left and/or right neighbour head. `context-info` holds for each head such information about the left and right neighbour, encoded as a bit mask.

`prefix-set` (number)
: A bit mask that holds all Gregorian head prefixes, such as `\virga` or `\quilisma`.

This grob interface is used in the following graphical object(s): Section 3.1.70 [NoteHead], page 326.

### 3.2.37 grid-line-interface

A line that is spanned between grid-points.

#### User settable properties:

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

#### Internal properties:

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

This grob interface is used in the following graphical object(s): Section 3.1.42 [GridLine], page 304.

### 3.2.38 grid-point-interface

A spanning point for grid lines.

This grob interface is used in the following graphical object(s): Section 3.1.43 [GridPoint], page 305.

### 3.2.39 grob-interface

A grob represents a piece of music notation.

All grobs have an X and Y position on the page. These X and Y positions are stored in a relative format, thus they can easily be combined by stacking them, hanging one grob to the side of another, or coupling them into grouping objects.

Each grob has a reference point (a.k.a. parent): The position of a grob is stored relative to that reference point. For example, the X reference point of a staccato dot usually is the note head that it applies to. When the note head is moved, the staccato dot moves along automatically.

A grob is often associated with a symbol, but some grobs do not print any symbols. They take care of grouping objects. For example, there is a separate grob that stacks staves vertically. The Section 3.1.68 [NoteCollision], page 325 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:

`X-extent` (pair of numbers)
: Hard coded extent in X direction.

`X-offset` (number)
: The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers)
: Hard coded extent in Y direction.

`Y-offset` (number)
: The vertical amount that this object is moved relative to its Y-parent.

`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-X-extent` (pair of numbers)
: A grob is enlarged in X dimension by this much.

`extra-Y-extent` (pair of numbers)
: A grob is enlarged in Y dimension by this much.

`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`.

`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.

`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 this grob and the staff when spacing according to `outside-staff-priority`.

`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.

`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.

`springs-and-rods` (boolean)
: Dummy variable for triggering spacing routines.

`stencil` (stencil)
: The symbol to print.

`transparent` (boolean)
: This makes the grob invisible.

`whiteout` (boolean)
: If true, the grob is printed over a white background to white-out underlying material, if the grob is visible. Usually #f by default.

## 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)
: For a beam or a stem, this is true if we depend on inter-staff spacing.

`interfaces` (list)
: A list of symbols indicating the interfaces supported by this object. It is initialized from the `meta` field.

`meta` (list) Provide meta information. It is an alist with the entries `name` and `interfaces`.

`pure-Y-offset-in-progress` (boolean)
: A debugging aid for catching cyclic dependencies.

`staff-symbol` (graphical (layout) object)
: The staff symbol grob that we are in.

This grob interface is used in the following graphical object(s): Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.3 [AccidentalPlacement], page 271, Section 3.1.4 [AccidentalSuggestion], page 272, Section 3.1.5 [Ambitus], page 273, Section 3.1.6 [AmbitusAccidental], page 274, Section 3.1.7 [AmbitusLine], page 275, Section 3.1.8 [AmbitusNoteHead], page 275, Section 3.1.9 [Arpeggio], page 276, Section 3.1.10 [BalloonTextItem], page 277, Section 3.1.11 [BarLine], page 277, Section 3.1.12 [BarNumber], page 279, Section 3.1.13 [BassFigure], page 281, Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.15 [BassFigureAlignmentPositioning], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.17 [BassFigureContinuation], page 282, Section 3.1.18 [BassFigureLine], page 283, Section 3.1.19 [Beam], page 283, Section 3.1.20 [BendAfter], page 285, Section 3.1.21 [BreakAlignGroup], page 285, Section 3.1.22 [BreakAlignment], page 286, Section 3.1.23 [BreathingSign], page 287, Section 3.1.24 [ChordName], page 287, Section 3.1.25 [Clef], page 288, Section 3.1.26 [ClusterSpanner], page 289, Section 3.1.27 [ClusterSpannerBeacon], page 290, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.29 [Custos], page 292, Section 3.1.30 [DotColumn], page 292, Section 3.1.31 [Dots], page 293, Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.37 [Episema], page 299, Section 3.1.38 [Fingering], page 300, Section 3.1.39 [FretBoard], page 302, Section 3.1.40 [Glissando], page 303, Section 3.1.41 [GraceSpacing], page 304, Section 3.1.42 [GridLine], page 304, Section 3.1.43 [GridPoint], page 305, Section 3.1.44 [Hairpin], page 305, Section 3.1.45 [HarmonicParenthesesItem], page 307, Section 3.1.46 [HorizontalBracket], page 307, Section 3.1.47 [InstrumentName], page 308, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.49 [KeyCancellation], page 310, Section 3.1.50 [KeySignature], page 311, Section 3.1.51 [LaissezVibrerTie], page 312, Section 3.1.52 [LaissezVibrerTieColumn], page 313, Section 3.1.53 [LedgerLineSpanner], page 313, Section 3.1.54 [LeftEdge], page 314, Section 3.1.55 [LigatureBracket], page 314, Section 3.1.56 [LyricExtender], page 315, Section 3.1.57 [LyricHyphen], page 316, Section 3.1.58 [LyricSpace], page 317, Section 3.1.59 [LyricText], page 317, Section 3.1.60 [MeasureGrouping], page 318, Section 3.1.61 [MelodyItem], page 319, Section 3.1.62 [MensuralLigature], page 319, Section 3.1.63 [MetronomeMark], page 320, Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.67 [NonMusicalPaperColumn], page 324, Section 3.1.68 [NoteCollision], page 325, Section 3.1.69 [NoteColumn], page 326, Section 3.1.70 [NoteHead], page 326, Section 3.1.71 [NoteName], page 327, Section 3.1.72 [NoteSpacing], page 327, Section 3.1.73 [OctavateEight], page 328, Section 3.1.74 [OttavaBracket], page 329, Section 3.1.75 [PaperColumn], page 330, Section 3.1.76 [ParenthesesItem], page 331, Section 3.1.77 [PercentRepeat], page 331, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.79 [PhrasingSlur], page 333, Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.81 [RehearsalMark], page 335, Section 3.1.82 [RepeatSlash], page 337, Section 3.1.83 [RepeatTie], page 337, Section 3.1.84

[RepeatTieColumn], page 338, Section 3.1.85 [Rest], page 339, Section 3.1.86 [RestCollision], page 339, Section 3.1.87 [Script], page 339, Section 3.1.88 [ScriptColumn], page 340, Section 3.1.89 [ScriptRow], page 341, Section 3.1.90 [Slur], page 341, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.93 [SpacingSpanner], page 344, Section 3.1.94 [SpanBar], page 345, Section 3.1.95 [StaffGrouper], page 346, Section 3.1.96 [StaffSpacing], page 347, Section 3.1.97 [StaffSymbol], page 347, Section 3.1.98 [StanzaNumber], page 348, Section 3.1.99 [Stem], page 348, Section 3.1.100 [StemTremolo], page 350, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352, Section 3.1.103 [SustainPedal], page 353, Section 3.1.104 [SustainPedalLineSpanner], page 354, Section 3.1.105 [System], page 355, Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357, Section 3.1.109 [SystemStartSquare], page 358, Section 3.1.110 [TabNoteHead], page 358, Section 3.1.111 [TextScript], page 360, Section 3.1.112 [TextSpanner], page 361, Section 3.1.113 [Tie], page 362, Section 3.1.114 [TieColumn], page 364, Section 3.1.115 [TimeSignature], page 364, Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.118 [TrillPitchHead], page 367, Section 3.1.119 [TrillSpanner], page 368, Section 3.1.120 [TupletBracket], page 369, Section 3.1.121 [TupletNumber], page 370, Section 3.1.122 [UnaCordaPedal], page 371, Section 3.1.123 [UnaCordaPedalLineSpanner], page 372, Section 3.1.124 [VaticanaLigature], page 373, Section 3.1.125 [VerticalAlignment], page 373, Section 3.1.126 [VerticalAxisGroup], page 373, Section 3.1.127 [VoiceFollower], page 375, Section 3.1.128 [VoltaBracket], page 376 and Section 3.1.129 [VoltaBracketSpanner], page 376.

### 3.2.40 hairpin-interface

A hairpin crescendo or decrescendo.

#### User settable properties:

`circled-tip` (boolean)
: Put a circle at start/end of hairpins (al/del niente).

`bound-padding` (number)
: The amount of padding to insert around spanner bounds.

`grow-direction` (direction)
: Crescendo or decrescendo?

`height` (dimension, in staff space)
: Height of an object in `staff-space` units.

#### Internal properties:

`adjacent-spanners` (array of grobs)
: An array of directly neighboring dynamic spanners.

This grob interface is used in the following graphical object(s): Section 3.1.44 [Hairpin], page 305.

### 3.2.41 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.

#### 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?

### Internal properties:

`items-worth-living` (array of grobs)
: An array of interesting items. If empty in a particular staff, then that staff is erased.

`important-column-ranks` (vector)
: A cache of columns that contain `items-worth-living` data.

`keep-alive-with` (array of grobs)
: An array of other `VerticalAxisGroups`. If any of them are alive, then we will stay alive.

This grob interface is used in the following graphical object(s): Section 3.1.126 [VerticalAxisGroup], page 373.

## 3.2.42 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.

`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 a text-spanner on both sides, for example a pedal bracket. Positive values shorten the text-spanner, while negative values lengthen it.

`connect-to-neighbor` (pair)
: Pair of booleans, indicating whether this grob looks as a continued break.

### Internal properties:

`columns` (array of grobs)
: An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

This grob interface is used in the following graphical object(s): Section 3.1.46 [HorizontalBracket], page 307, Section 3.1.74 [OttavaBracket], page 329 and Section 3.1.128 [VoltaBracket], page 376.

## 3.2.43 instrument-specific-markup-interface

Instrument-specific markup (like fret boards or harp pedal diagrams).

### User settable properties:

`fret-diagram-details` (list)
: An alist of detailed grob properties for fret diagrams. Each alist entry consists of a `(`*`property . value`*`)` pair. The properties which can be included in `fret-diagram-details` include the following:

- `barre-type` – Type of barre indication used. Choices include `curved`, `straight`, and `none`. Default `curved`.
- `capo-thickness` – Thickness of capo indicator, in multiples of fret-space. Default value 0.5.
- `dot-color` – Color of dots. Options include `black` and `white`. Default `black`.
- `dot-label-font-mag` – Magnification for font used to label fret dots. Default value 1.
- `dot-position` – Location of dot in fret space. Default 0.6 for dots without labels, 0.95-`dot-radius` for dots with labels.
- `dot-radius` – Radius of dots, in terms of fret spaces. Default value 0.425 for labeled dots, 0.25 for unlabeled dots.
- `finger-code` – Code for the type of fingering indication used. Options include `none`, `in-dot`, and `below-string`. Default `none` for markup fret diagrams, `below-string` for `FretBoards` fret diagrams.
- `fret-count` – The number of frets. Default 4.
- `fret-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.
- `label-dir` – Side to which the fret label is attached. `-1`, `#LEFT`, or `#DOWN` for left or down; `1`, `#RIGHT`, or `#UP` for right or up. Default `#RIGHT`.
- `mute-string` – Character string to be used to indicate muted string. Default `"x"`.
- `number-type` – Type of numbers to use in fret label. Choices include `roman-lower`, `roman-upper`, and `arabic`. 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-label-font-mag` – The magnification of the font used to label fingerings at the string, rather than in the dot. Default value 0.6 for `normal` orientation, 0.5 for `landscape` and `opposing-landscape`.
- `string-thickness-factor` – Factor for changing thickness of each string in the fret diagram. Thickness of string $k$ is given by `thickness` * (1+`string-thickness-factor`) ^ ($k$-1). Default 0.
- `top-fret-thickness` – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.
- `xo-font-magnification` – Magnification used for mute and open string indicators. Default value 0.5.
- `xo-padding` – Padding for open and mute indicators from top fret. Default value 0.25.

`graphical` (boolean)
: Display in graphical (vs. text) form.

`harp-pedal-details` (list)
: An alist of detailed grob properties for harp pedal diagrams. Each alist entry consists of a `(property . value)` pair. The properties which can be included in harp-pedal-details include the following:

  - `box-offset` – Vertical shift of the center of flat/sharp pedal boxes above/below the horizontal line. Default value 0.8.
  - `box-width` – Width of each pedal box. Default value 0.4.
  - `box-height` – Height of each pedal box. Default value 1.0.
  - `space-before-divider` – Space between boxes before the first divider (so that the diagram can be made symmetric). Default value 0.8.
  - `space-after-divider` – Space between boxes after the first divider. Default value 0.8.
  - `circle-thickness` – Thickness (in unit of the line-thickness) of the ellipse around circled pedals. Default value 0.5.
  - `circle-x-padding` – Padding in X direction of the ellipse around circled pedals. Default value 0.15.
  - `circle-y-padding` – Padding in Y direction of the ellipse around circled pedals. Default value 0.2.

`size` (number)
: Size of object, relative to standard size.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

This grob interface is used in the following graphical object(s): Section 3.1.111 [TextScript], page 360.

### 3.2.44 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): Section 3.1.1 [Accidental], page 270, Section 3.1.2 [AccidentalCautionary], page 270, Section 3.1.3 [AccidentalPlacement], page 271, Section 3.1.4 [AccidentalSuggestion], page 272, Section 3.1.5 [Ambitus], page 273, Section 3.1.6 [AmbitusAccidental], page 274, Section 3.1.7 [AmbitusLine], page 275, Section 3.1.8 [AmbitusNoteHead], page 275, Section 3.1.9 [Arpeggio], page 276, Section 3.1.10 [BalloonTextItem], page 277, Section 3.1.11 [BarLine], page 277, Section 3.1.12 [BarNumber], page 279, Section 3.1.13 [BassFigure], page 281, Section 3.1.16 [BassFigureBracket], page 282, Section 3.1.21 [BreakAlignGroup], page 285, Section 3.1.22 [BreakAlignment], page 286, Section 3.1.23 [BreathingSign], page 287, Section 3.1.24 [ChordName], page 287, Section 3.1.25 [Clef], page 288, Section 3.1.27 [ClusterSpannerBeacon], page 290, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.29 [Custos], page 292, Section 3.1.30 [DotColumn], page 292, Section 3.1.31 [Dots], page 293, Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.35 [DynamicText], page 297, Section 3.1.38 [Fingering], page 300, Section 3.1.39 [FretBoard], page 302, Section 3.1.42 [GridLine], page 304, Section 3.1.43 [GridPoint], page 305, Section 3.1.45 [HarmonicParenthesesItem], page 307, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.49 [KeyCancellation], page 310, Section 3.1.50 [KeySignature], page 311, Section 3.1.51 [LaissezVibrerTie], page 312, Section 3.1.52 [LaissezVibrerTieColumn], page 313, Section 3.1.54 [LeftEdge], page 314, Section 3.1.59 [LyricText], page 317, Section 3.1.61 [MelodyItem], page 319, Section 3.1.63 [MetronomeMark], page 320, Section 3.1.67 [NonMusicalPaperColumn], page 324, Section 3.1.68 [NoteCollision], page 325, Section 3.1.69 [NoteColumn], page 326, Section 3.1.70 [NoteHead], page 326, Section 3.1.71 [NoteName], page 327, Section 3.1.72 [NoteSpacing], page 327, Section 3.1.73 [OctavateEight], page 328, Section 3.1.75 [PaperColumn], page 330, Section 3.1.76 [ParenthesesItem], page 331, Section 3.1.81 [RehearsalMark], page 335, Section 3.1.82 [RepeatSlash], page 337, Section 3.1.83 [RepeatTie], page 337, Section 3.1.84 [RepeatTieColumn], page 338, Section 3.1.85 [Rest], page 339, Section 3.1.86 [RestCollision], page 339, Section 3.1.87 [Script], page 339, Section 3.1.88 [ScriptColumn], page 340, Section 3.1.89 [ScriptRow],

page 341, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.94 [SpanBar], page 345, Section 3.1.96 [StaffSpacing], page 347, Section 3.1.98 [StanzaNumber], page 348, Section 3.1.99 [Stem], page 348, Section 3.1.100 [StemTremolo], page 350, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352, Section 3.1.103 [SustainPedal], page 353, Section 3.1.110 [TabNoteHead], page 358, Section 3.1.111 [TextScript], page 360, Section 3.1.115 [TimeSignature], page 364, Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.118 [TrillPitchHead], page 367 and Section 3.1.122 [UnaCordaPedal], page 371.

### 3.2.45 key-cancellation-interface

A key cancellation.

This grob interface is used in the following graphical object(s): Section 3.1.49 [KeyCancellation], page 310.

### 3.2.46 key-signature-interface

A group of accidentals, to be printed as signature sign.

#### User settable properties:

`alteration-alist` (list)
: List of `(`*`pitch . accidental`*`)` pairs for key signature.

`c0-position` (integer)
: An integer indicating the position of middle C.

`glyph-name-alist` (list)
: An alist of key-string pairs.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`padding-pairs` (list)
: An alist mapping `(`*`name . name`*`)` to distances.

This grob interface is used in the following graphical object(s): Section 3.1.49 [KeyCancellation], page 310 and Section 3.1.50 [KeySignature], page 311.

### 3.2.47 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.

#### 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.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

### Internal properties:

`note-heads` (array of grobs)
: An array of note head grobs.

This grob interface is used in the following graphical object(s): Section 3.1.53 [LedgerLineSpanner], page 313.

## 3.2.48 ledgered-interface

Objects that need ledger lines, typically note heads. See also Section 3.2.47 [ledger-line-spanner-interface], page 406.

### 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): Section 3.1.8 [AmbitusNoteHead], page 275, Section 3.1.70 [NoteHead], page 326 and Section 3.1.118 [TrillPitchHead], page 367.

## 3.2.49 ligature-bracket-interface

A bracket indicating a ligature in the original edition.

### User settable properties:

`width` (dimension, in staff space)
: The width of a grob measured in staff space.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

`height` (dimension, in staff space)
: Height of an object in `staff-space` units.

This grob interface is not used in any graphical object.

## 3.2.50 ligature-interface

A ligature.

This grob interface is not used in any graphical object.

## 3.2.51 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 `0.0` (no line) and `1.0` (continuous line).

`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)
: Line thickness, generally measured in `line-thickness`.

`zigzag-length` (dimension, in staff space)
: The length of the lines of a zigzag, relative to `zigzag-width`. A value of `1` gives 60-degree zigzags.

`zigzag-width` (dimension, in staff space)
: The width of one zigzag squiggle. This number is adjusted slightly so that the glissando line can be constructed from a whole number of squiggles.

This grob interface is used in the following graphical object(s): Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.37 [Episema], page 299, Section 3.1.40 [Glissando], page 303, Section 3.1.44 [Hairpin], page 305, Section 3.1.46 [HorizontalBracket], page 307, Section 3.1.55 [LigatureBracket], page 314, Section 3.1.74 [OttavaBracket], page 329, Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.112 [TextSpanner], page 361, Section 3.1.119 [TrillSpanner], page 368, Section 3.1.120 [TupletBracket], page 369, Section 3.1.127 [VoiceFollower], page 375 and Section 3.1.128 [VoltaBracket], page 376.

### 3.2.52 line-spanner-interface

Generic line drawn between two objects, e.g., for use with glissandi.

#### User settable properties:

`bound-details` (list)
: An alist of properties for determining attachments of spanners to edges.

`extra-dy` (number)
: Slope glissandi this much extra.

`gap` (dimension, in staff space)
: Size of a gap in a variable symbol.

`left-bound-info` (list)
: An alist of properties for determining attachments of spanners to edges.

`right-bound-info` (list)
: An alist of properties for determining attachments of spanners to edges.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

`to-barline` (boolean)
: If true, the spanner will stop at the bar line just before it would otherwise stop.

#### Internal properties:

`note-columns` (array of grobs)
: An array of `NoteColumn` grobs.

This grob interface is used in the following graphical object(s): Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.37 [Episema], page 299, Section 3.1.40 [Glissando], page 303, Section 3.1.112 [TextSpanner], page 361, Section 3.1.119 [TrillSpanner], page 368 and Section 3.1.127 [VoiceFollower], page 375.

### 3.2.53 lyric-extender-interface

The extender is a simple line at the baseline of the lyric that helps show the length of a melisma (a tied or slurred note).

#### User settable properties:

`left-padding` (dimension, in staff space)
: The amount of space that is put left to an object (e.g., a lyric extender).

`next` (graphical (layout) object)
: Object that is next relation (e.g., the lyric syllable following an extender).

`right-padding` (dimension, in staff space)
: Space to insert on the right side of an object (e.g., between note and its accidentals).

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

#### Internal properties:

`heads` (array of grobs)
: An array of note heads.

This grob interface is used in the following graphical object(s): Section 3.1.56 [LyricExtender], page 315.

### 3.2.54 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.

`minimum-distance` (dimension, in staff space)
: Minimum distance between rest and notes or beam.

`minimum-length` (dimension, in staff space)
: Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

This grob interface is used in the following graphical object(s): Section 3.1.57 [LyricHyphen], page 316 and Section 3.1.58 [LyricSpace], page 317.

### 3.2.55 lyric-interface

Any object that is related to lyrics.

This grob interface is used in the following graphical object(s): Section 3.1.56 [LyricExtender], page 315 and Section 3.1.57 [LyricHyphen], page 316.

### 3.2.56 lyric-syllable-interface

A single piece of lyrics.

This grob interface is used in the following graphical object(s): Section 3.1.59 [LyricText], page 317.

### 3.2.57 mark-interface

A rehearsal mark.

This grob interface is used in the following graphical object(s): Section 3.1.81 [RehearsalMark], page 335.

### 3.2.58 measure-grouping-interface

This object indicates groups of beats. Valid choices for `style` are `bracket` and `triangle`.

#### User settable properties:

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`height` (dimension, in staff space)
: Height of an object in `staff-space` units.

This grob interface is used in the following graphical object(s): Section 3.1.60 [MeasureGrouping], page 318.

### 3.2.59 melody-spanner-interface

Context dependent typesetting decisions.

#### User settable properties:

`neutral-direction` (direction)
: Which direction to take in the center of the staff.

#### Internal properties:

`stems` (array of grobs)
: An array of stem objects.

This grob interface is used in the following graphical object(s): Section 3.1.61 [MelodyItem], page 319.

### 3.2.60 mensural-ligature-interface

A mensural ligature.

#### User settable properties:

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

#### Internal properties:

`delta-position` (number)
: The vertical position difference.

`flexa-width` (dimension, in staff space)
: The width of a flexa shape in a ligature grob in (in `staff-space` units).

`head-width` (dimension, in staff space)
: The width of this ligature head.

`join-right-amount` (number)
: A length used for calculating the Y-extent of mensural ligatures.

`primitive` (integer)
: A pointer to a ligature primitive, i.e., an item similar to a note head that is part of a ligature.

This grob interface is used in the following graphical object(s): Section 3.1.62 [MensuralLigature], page 319 and Section 3.1.70 [NoteHead], page 326.

### 3.2.61 metronome-mark-interface

A metronome mark.

This grob interface is used in the following graphical object(s): Section 3.1.63 [MetronomeMark], page 320.

### 3.2.62 multi-measure-interface

Multi measure rest, and the text or number that is printed over it.

#### User settable properties:

`bound-padding` (number)
: The amount of padding to insert around spanner bounds.

This grob interface is used in the following graphical object(s): Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322 and Section 3.1.66 [MultiMeasureRestText], page 323.

### 3.2.63 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.

`measure-count` (integer)
: The number of measures for a multi-measure rest.

`minimum-length` (dimension, in staff space)
: Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`spacing-pair` (pair)
: A pair of alignment symbols which set an object's spacing relative to its left and right `BreakAlignment`s.

  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)
: Bar line thickness, measured in `line-thickness`.

### Internal properties:

`use-breve-rest` (boolean)
: Use breve rests for measures longer than a whole rest.

This grob interface is used in the following graphical object(s): Section 3.1.64 [MultiMeasureRest], page 321 and Section 3.1.77 [PercentRepeat], page 331.

## 3.2.64 note-collision-interface

An object that handles collisions between notes with different stem directions and horizontal shifts. Most of the interesting properties are to be set in Section 3.2.65 [note-column-interface], page 413: these are `force-hshift` and `horizontal-shift`.

### User settable properties:

`merge-differently-dotted` (boolean)
: Merge note heads in collisions, even if they have a different number of dots. This is normal notation for some types of polyphonic music.

  `merge-differently-dotted` only applies to opposing stem directions (i.e., voice 1 & 2).

`merge-differently-headed` (boolean)
: Merge note heads in collisions, even if they have different note heads. The smaller of the two heads is rendered invisible. This is used in polyphonic guitar notation. The value of this setting is used by Section "note-collision-interface" in *Internals Reference*.

  `merge-differently-headed` only applies to opposing stem directions (i.e., voice 1 & 2).

`prefer-dotted-right` (boolean)
: For note collisions, prefer to shift dotted up-note to the right, rather than shifting just the dot.

### Internal properties:

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.68 [NoteCollision], page 325.

## 3.2.65 note-column-interface

Stem and noteheads combined.

### User settable properties:

`force-hshift` (number)
: This specifies a manual shift for notes in collisions. The unit is the note head width of the first voice note. This is used by Section "note-collision-interface" in *Internals Reference*.

`horizontal-shift` (integer)
: An integer that identifies ranking of `NoteColumn`s for horizontal shifting. This is used by Section "note-collision-interface" in *Internals Reference*.

`ignore-collision` (boolean)
: If set, don't do note collision resolution on this `NoteColumn`.

### Internal properties:

`arpeggio` (graphical (layout) object)
: A pointer to an `Arpeggio` object.

`note-heads` (array of grobs)
: An array of note head grobs.

`rest` (graphical (layout) object)
: A pointer to a `Rest` object.

`rest-collision` (graphical (layout) object)
: A rest collision that a rest is in.

`stem` (graphical (layout) object)
: A pointer to a `Stem` object.

This grob interface is used in the following graphical object(s): Section 3.1.69 [NoteColumn], page 326.

## 3.2.66 note-head-interface

A note head. There are many possible values for `style`. For a complete list, see Section "Note head styles" in *Notation Reference*.

### User settable properties:

`note-names` (vector)
: Vector of strings containing names for easy-notation note heads.

`glyph-name` (string)
: The glyph name within the font.

`stem-attachment` (pair of numbers)
: An `(x . y)` pair where the stem attaches to the notehead.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

### Internal properties:

`accidental-grob` (graphical (layout) object)
: The accidental for this note.

This grob interface is used in the following graphical object(s): Section 3.1.8 [AmbitusNoteHead], page 275, Section 3.1.70 [NoteHead], page 326, Section 3.1.110 [TabNoteHead], page 358 and Section 3.1.117 [TrillPitchGroup], page 366.

## 3.2.67 note-name-interface

Note names.

This grob interface is used in the following graphical object(s): Section 3.1.71 [NoteName], page 327.

## 3.2.68 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.

`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.

`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.

### Internal properties:

`left-items` (array of grobs)
: DOCME

`right-items` (array of grobs)
: DOCME

This grob interface is used in the following graphical object(s): Section 3.1.72 [NoteSpacing], page 327.

## 3.2.69 only-prebreak-interface

Kill this grob after the line breaking process.

This grob interface is not used in any graphical object.

### 3.2.70 ottava-bracket-interface

An ottava bracket.

#### User settable properties:

`edge-height` (pair)
: A pair of numbers specifying the heights of the vertical edges: `(left-height . right-height)`.

`bracket-flare` (pair of numbers)
: A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`shorten-pair` (pair of numbers)
: The lengths to shorten a text-spanner on both sides, for example a pedal bracket. Positive values shorten the text-spanner, while negative values lengthen it.

`minimum-length` (dimension, in staff space)
: Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

This grob interface is used in the following graphical object(s): Section 3.1.74 [OttavaBracket], page 329.

### 3.2.71 paper-column-interface

`Paper_column` objects form the top-most X parents for items. There are two types of columns: musical and non-musical, to which musical and non-musical objects are attached respectively. The spacing engine determines the X positions of these objects.

They are numbered, the first (leftmost) is column 0. Numbering happens before line breaking, and columns are not renumbered after line breaking. Since many columns go unused, you should only use the rank field to get ordering information. Two adjacent columns may have non-adjacent numbers.

#### User settable properties:

`between-cols` (pair)
: Where to attach a loose column to.

`full-measure-extra-space` (number)
: Extra space that is allocated at the beginning of a measure with only one note. This property is read from the NonMusicalPaperColumn that begins the measure.

`labels` (list)
: List of labels (symbols) placed on a column.

`line-break-system-details` (list)
: An alist of properties to use if this column is the start of a system.

`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`.

`page-break-penalty` (number)
: Penalty for page break at this column. This affects the choices of the page breaker; it avoids a page break at a column with a positive penalty and prefers a page break at a column with a negative penalty.

`page-break-permission` (symbol)
: Instructs the page breaker on whether to put a page break at this column. Can be `force` or `allow`.

`page-turn-penalty` (number)
: Penalty for a page turn at this column. This affects the choices of the page breaker; it avoids a page turn at a column with a positive penalty and prefers a page turn at a column with a negative penalty.

`page-turn-permission` (symbol)
: Instructs the page breaker on whether to put a page turn at this column. Can be `force` or `allow`.

`rhythmic-location` (rhythmic location)
: Where (bar number, measure position) in the score.

`shortest-playing-duration` (moment)
: The duration of the shortest note playing here.

`shortest-starter-duration` (moment)
: The duration of the shortest note that starts here.

`used` (boolean)
: If set, this spacing column is kept in the spacing problem.

`when` (moment)
: Global time step associated with this column happen?

### Internal properties:

`bounded-by-me` (array of grobs)
: An array of spanners that have this column as start/begin point. Only columns that have grobs or act as bounds are spaced.

`grace-spacing` (graphical (layout) object)
: A run of grace notes.

`maybe-loose` (boolean)
: Used to mark a breakable column that is loose if and only if it is in the middle of a line.

`spacing` (graphical (layout) object)
: The spacing spanner governing this section.

This grob interface is used in the following graphical object(s): Section 3.1.67 [NonMusicalPaperColumn], page 324 and Section 3.1.75 [PaperColumn], page 330.

## 3.2.72 parentheses-interface

Parentheses for other objects.

### User settable properties:

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`stencils` (list)
: Multiple stencils, used as intermediate value.

This grob interface is used in the following graphical object(s): Section 3.1.45 [HarmonicParenthesesItem], page 307, Section 3.1.76 [ParenthesesItem], page 331 and Section 3.1.117 [TrillPitchGroup], page 366.

## 3.2.73 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)
: Line thickness, generally measured in `line-thickness`.

This grob interface is used in the following graphical object(s): Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.77 [PercentRepeat], page 331, Section 3.1.78 [PercentRepeatCounter], page 332 and Section 3.1.82 [RepeatSlash], page 337.

## 3.2.74 percent-repeat-item-interface

Repeats that look like percent signs.

### User settable properties:

`dot-negative-kern` (number)
: The space to remove between a dot and a slash in percent repeat glyphs. Larger values bring the two elements closer together.

`slash-negative-kern` (number)
: The space to remove between slashes in percent repeat glyphs. Larger values bring the two elements closer together.

`slope` (number)
: The slope of this object.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

This grob interface is used in the following graphical object(s): Section 3.1.32 [DoublePercentRepeat], page 293, Section 3.1.33 [DoublePercentRepeatCounter], page 294 and Section 3.1.82 [RepeatSlash], page 337.

### 3.2.75 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.

`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 a text-spanner on both sides, for example a pedal bracket. Positive values shorten the text-spanner, while negative values lengthen it.

`bracket-flare` (pair of numbers)
: A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

#### Internal properties:

`pedal-text` (graphical (layout) object)
: A pointer to the text of a mixed-style piano pedal.

This grob interface is used in the following graphical object(s): Section 3.1.80 [PianoPedalBracket], page 334.

### 3.2.76 piano-pedal-interface

A piano pedal sign.

This grob interface is used in the following graphical object(s): Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.103 [SustainPedal], page 353, Section 3.1.104 [SustainPedalLineSpanner], page 354 and Section 3.1.123 [UnaCordaPedalLineSpanner], page 372.

### 3.2.77 piano-pedal-script-interface

A piano pedal sign, fixed size.

This grob interface is used in the following graphical object(s): Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.103 [SustainPedal], page 353 and Section 3.1.122 [UnaCordaPedal], page 371.

### 3.2.78 pitched-trill-interface

A note head to indicate trill pitches.

#### Internal properties:

`accidental-grob` (graphical (layout) object)
: The accidental for this note.

This grob interface is used in the following graphical object(s): Section 3.1.118 [TrillPitchHead], page 367.

### 3.2.79 rest-collision-interface

Move around ordinary rests (not multi-measure-rests) to avoid conflicts.

### User settable properties:

`minimum-distance` (dimension, in staff space)
: Minimum distance between rest and notes or beam.

### Internal properties:

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

This grob interface is used in the following graphical object(s): Section 3.1.86 [RestCollision], page 339.

## 3.2.80 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.

This grob interface is used in the following graphical object(s): Section 3.1.64 [MultiMeasureRest], page 321 and Section 3.1.85 [Rest], page 339.

## 3.2.81 rhythmic-grob-interface

Any object with a duration. Used to determine which grobs are interesting enough to maintain a hara-kiri staff.

This grob interface is used in the following graphical object(s): Section 3.1.13 [BassFigure], page 281, Section 3.1.24 [ChordName], page 287, Section 3.1.27 [ClusterSpannerBeacon], page 290, Section 3.1.39 [FretBoard], page 302, Section 3.1.59 [LyricText], page 317, Section 3.1.70 [NoteHead], page 326, Section 3.1.82 [RepeatSlash], page 337, Section 3.1.85 [Rest], page 339 and Section 3.1.110 [TabNoteHead], page 358.

## 3.2.82 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.

### Internal properties:

`dot` (graphical (layout) object)
: A reference to a `Dots` object.

`stem` (graphical (layout) object)
: A pointer to a `Stem` object.

This grob interface is used in the following graphical object(s): Section 3.1.8 [AmbitusNoteHead], page 275, Section 3.1.70 [NoteHead], page 326, Section 3.1.85 [Rest], page 339, Section 3.1.110 [TabNoteHead], page 358 and Section 3.1.118 [TrillPitchHead], page 367.

## 3.2.83 script-column-interface

An interface that sorts scripts according to their `script-priority` and `outside-staff-priority`.

This grob interface is used in the following graphical object(s): Section 3.1.88 [ScriptColumn], page 340 and Section 3.1.89 [ScriptRow], page 341.

## 3.2.84 script-interface

An object that is put above or below a note.

### User settable properties:

`add-stem-support` (boolean)
: If set, the `Stem` object is included in this script's support.

`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 sorting key that determines in what order a script is within a stack of scripts.

`side-relative-direction` (direction)
: Multiply direction of `direction-source` with this to get the direction of this object.

`slur-padding` (number)
: Extra distance between slur and script.

`toward-stem-shift` (number)
: Amount by which scripts are shifted toward the stem if their direction coincides with the stem direction. `0.0` means keep the default position (centered on the note head), `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-stencil` (pair)
: A pair `(type . arg)` which acts as an index for looking up a `Stencil` object.

`slur` (graphical (layout) object)
: A pointer to a `Slur` object.

This grob interface is used in the following graphical object(s): Section 3.1.4 [AccidentalSuggestion], page 272, Section 3.1.35 [DynamicText], page 297 and Section 3.1.87 [Script], page 339.

### 3.2.85 self-alignment-interface

Position this object on itself and/or on its parent. To this end, the following functions are provided:

`Self_alignment_interface::[xy]_aligned_on_self`
: Align self on reference point, using `self-alignment-X` and `self-alignment-Y`.

`Self_alignment_interface::aligned_on_[xy]_parent`
`Self_alignment_interface::centered_on_[xy]_parent`
: Shift the object so its own reference point is centered on the extent of the parent

#### User settable properties:

`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.

`self-alignment-Y` (number)
: Like `self-alignment-X` but for the Y axis.

This grob interface is used in the following graphical object(s): Section 3.1.4 [AccidentalSuggestion], page 272, Section 3.1.12 [BarNumber], page 279, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.35 [DynamicText], page 297, Section 3.1.38 [Fingering], page 300, Section 3.1.42 [GridLine], page 304, Section 3.1.44 [Hairpin], page 305, Section 3.1.47 [InstrumentName], page 308, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.59 [LyricText], page 317, Section 3.1.63 [MetronomeMark], page 320, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.73 [OctavateEight], page 328, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.81 [RehearsalMark], page 335, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352, Section 3.1.103 [SustainPedal], page 353, Section 3.1.111 [TextScript], page 360 and Section 3.1.122 [UnaCordaPedal], page 371.

### 3.2.86 semi-tie-column-interface

The interface for a column of l.v. (laissez vibrer) ties.

#### User settable properties:

`head-direction` (direction)
: Are the note heads left or right in a semitie?

`tie-configuration` (list)
: List of `(position . dir)` pairs, indicating the desired tie configuration, where *position* is the offset from the center of the staff in staff space and

*dir* indicates the direction of the tie (`1`=>up, `-1`=>down, `0`=>center). A non-pair entry in the list causes the corresponding tie to be formatted automatically.

### Internal properties:

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.52 [LaissezVibrerTieColumn], page 313 and Section 3.1.84 [RepeatTieColumn], page 338.

## 3.2.87 semi-tie-interface

A tie which is only on one side connected to a note head.

### User settable properties:

`control-points` (list)
: 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.

`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`.

`details` (list)
: Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`head-direction` (direction)
: Are the note heads left or right in a semitie?

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

### Internal properties:

`note-head` (graphical (layout) object)
: A single note head.

This grob interface is used in the following graphical object(s): Section 3.1.51 [LaissezVibrerTie], page 312 and Section 3.1.83 [RepeatTie], page 337.

## 3.2.88 separation-item-interface

Item that computes widths to generate spacing rods.

### User settable properties:

`X-extent` (pair of numbers)
: Hard coded extent in X direction.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`horizontal-skylines` (pair of skylines)
: Two skylines, one to the left and one to the right of this grob.

### Internal properties:

`conditional-elements` (array of grobs)
: Internal use only.

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

This grob interface is used in the following graphical object(s): Section 3.1.67 [NonMusicalPaperColumn], page 324, Section 3.1.69 [NoteColumn], page 326 and Section 3.1.75 [PaperColumn], page 330.

## 3.2.89 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:

`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-space` (dimension, in staff space)
: Minimum distance that the victim should move (after padding).

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`side-axis` (number)
: If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`slur-padding` (number)
: Extra distance between slur and script.

`staff-padding` (dimension, in staff space)
: Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

### 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): Section 3.1.4 [AccidentalSuggestion], page 272, Section 3.1.6 [AmbitusAccidental], page 274, Section 3.1.9 [Arpeggio], page 276, Section 3.1.12 [BarNumber], page 279, Section 3.1.15 [BassFigureAlignmentPositioning], page 281, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.37 [Episema], page 299, Section 3.1.38 [Fingering], page 300, Section 3.1.46 [HorizontalBracket], page 307, Section 3.1.47 [InstrumentName], page 308, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.60 [MeasureGrouping], page 318, Section 3.1.63 [MetronomeMark], page 320, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.73 [OctavateEight], page 328, Section 3.1.74 [OttavaBracket], page 329, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.81 [RehearsalMark], page 335, Section 3.1.87 [Script], page 339, Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.98 [StanzaNumber], page 348, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352, Section 3.1.104 [SustainPedalLineSpanner], page 354, Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357, Section 3.1.109 [SystemStartSquare], page 358, Section 3.1.111 [TextScript], page 360, Section 3.1.112 [TextSpanner], page 361, Section 3.1.116 [TrillPitchAccidental], page 365, Section 3.1.117 [TrillPitchGroup], page 366, Section 3.1.119 [TrillSpanner], page 368, Section 3.1.123 [UnaCordaPedalLineSpanner], page 372, Section 3.1.128 [VoltaBracket], page 376 and Section 3.1.129 [VoltaBracketSpanner], page 376.

### 3.2.90 slur-interface

A slur. The following properties may be set in the `details` list.

`region-size`
: Size of region (in staff spaces) for determining potential endpoints in the Y direction.

`head-encompass-penalty`
: Demerit to apply when note heads collide with a slur.

`stem-encompass-penalty`
: Demerit to apply when stems collide with a slur.

`closeness-factor`
: Additional demerit used when scoring encompasses.

`edge-attraction-factor`
: Factor used to calculate the demerit for distances between slur endpoints and their corresponding base attachments.

`same-slope-penalty`
: Demerit for slurs with attachment points that are horizontally aligned.

`steeper-slope-factor`
: Factor used to calculate demerit only if this slur is not broken.

`non-horizontal-penalty`
: Demerit for slurs with attachment points that are not horizontally aligned.

`max-slope`
: The maximum slope allowed for this slur.

`max-slope-factor`
: Factor that calculates demerit based on the max slope.

`free-head-distance`
: The amount of vertical free space that must exist between a slur and note heads.

`absolute-closeness-measure`
: Factor to calculate demerit for variance between a note head and slur.

`extra-object-collision-penalty`
: Factor to calculate demerit for extra objects that the slur encompasses, including accidentals, fingerings, and tuplet numbers.

`accidental-collision`
: Factor to calculate demerit for `Accidental` objects that the slur encompasses. This property value replaces the value of `extra-object-collision-penalty`.

`extra-encompass-free-distance`
: The amount of vertical free space that must exist between a slur and various objects it encompasses, including accidentals, fingerings, and tuplet numbers.

`extra-encompass-collision-distance`
: This detail is currently unused.

`head-slur-distance-factor`
: Factor to calculate demerit for variance between a note head and slur.

`head-slur-distance-max-ratio`
: The maximum value for the ratio of distance between a note head and slur.

`free-slur-distance`
: The amount of vertical free space that must exist between adjacent slurs. This subproperty only works for `PhrasingSlur`.

`edge-slope-exponent`
: Factor used to calculate the demerit for the slope of a slur near its endpoints; a larger value yields a larger demerit.

## User settable properties:

`annotation` (string)
: Annotate a grob for debug purposes.

`avoid-slur` (symbol)
: Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

`control-points` (list)
: List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

`dash-definition` (pair)
: List of `dash-elements` defining the dash structure. Each `dash-element` has a starting t value, an ending t-value, a `dash-fraction`, and a `dash-period`.

`details` (list)
: Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction)
: If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`eccentricity` (number)
: How asymmetrical to make a slur. Positive means move the center to the right.

`height-limit` (dimension, in staff space)
: Maximum slur height: The longer the slur, the closer it is to this height.

`inspect-quants` (pair of numbers)
: If debugging is set, set beam and slur quants to this position, and print the respective scores.

`inspect-index` (integer)
: If debugging is set, set beam and slur configuration to this index, and print the respective scores.

`line-thickness` (number)
: The thickness of the tie or slur contour.

`positions` (pair of numbers)
: Pair of staff coordinates `(`*`left . right`*`)`, where both *left* and *right* are in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`ratio` (number)
: Parameter for slur shape. The higher this number, the quicker the slur attains its `height-limit`.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

### Internal properties:

`encompass-objects` (array of grobs)
: Objects that a slur should avoid in addition to notes and stems.

`note-columns` (array of grobs)
: An array of `NoteColumn` grobs.

`quant-score` (string)
: The beam quanting score; stored for debugging.

This grob interface is used in the following graphical object(s): Section 3.1.79 [PhrasingSlur], page 333 and Section 3.1.90 [Slur], page 341.

## 3.2.91 spaceable-grob-interface

A layout object that takes part in the spacing problem.

### User settable properties:

`allow-loose-spacing` (boolean)
: If set, column can be detached from main spacing.

`keep-inside-line` (boolean)
: If set, this column cannot have objects sticking into the margin.

`measure-length` (moment)
: Length of a measure. Used in some spacing situations.

### Internal properties:

`ideal-distances` (list)
: `(obj . (dist . strength))` pairs.

`left-neighbor` (graphical (layout) object)
: 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): Section 3.1.67 [NonMusicalPaperColumn], page 324 and Section 3.1.75 [PaperColumn], page 330.

## 3.2.92 spacing-interface

This object calculates the desired and minimum distances between two columns.

### Internal properties:

`left-items` (array of grobs)
: DOCME

`right-items` (array of grobs)
: DOCME

This grob interface is used in the following graphical object(s): Section 3.1.72 [NoteSpacing], page 327 and Section 3.1.96 [StaffSpacing], page 347.

## 3.2.93 spacing-options-interface

Supports setting of spacing variables.

### User settable properties:

`spacing-increment` (number)
: Add this much space for a doubled duration. Typically, the width of a note head. See also Section "spacing-spanner-interface" in *Internals Reference*.

`shortest-duration-space` (dimension, in staff space)
: Start with this much space for the shortest duration. This is expressed in `spacing-increment` as unit. See also Section "spacing-spanner-interface" in *Internals Reference*.

This grob interface is used in the following graphical object(s): Section 3.1.41 [GraceSpacing], page 304 and Section 3.1.93 [SpacingSpanner], page 344.

### 3.2.94 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 proportonial 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` (dimension, in staff space)
: Start with this much space for the shortest duration. This is expressed in `spacing-increment` as unit. See also Section "spacing-spanner-interface" in *Internals Reference*.

`spacing-increment` (number)
: Add this much space for a doubled duration. 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 durations. This looks better in complex polyphonic patterns.

This grob interface is used in the following graphical object(s): Section 3.1.93 [SpacingSpanner], page 344.

### 3.2.95 span-bar-interface

A bar line that is spanned between other barlines. This interface is used for bar lines that connect different staves.

#### User settable properties:

`glyph-name` (string)
: The glyph name within the font.

### Internal properties:

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

`pure-Y-common` (graphical (layout) object)
: A cache of the `common_refpoint_of_array` of the `elements` grob set.

`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`.

This grob interface is used in the following graphical object(s): Section 3.1.94 [SpanBar], page 345.

## 3.2.96 spanner-interface

Some objects are horizontally spanned between objects. For example, slurs, beams, ties, etc. These grobs form a subtype called `Spanner`. All spanners have two span points (these must be `Item` objects), one on the left and one on the right. The left bound is also the X reference point of the spanner.

### User settable properties:

`minimum-length` (dimension, in staff space)
: Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`to-barline` (boolean)
: If true, the spanner will stop at the bar line just before it would otherwise stop.

This grob interface is used in the following graphical object(s): Section 3.1.14 [BassFigureAlignment], page 281, Section 3.1.15 [BassFigureAlignmentPositioning], page 281, Section 3.1.17 [BassFigureContinuation], page 282, Section 3.1.18 [BassFigureLine], page 283, Section 3.1.19 [Beam], page 283, Section 3.1.20 [BendAfter], page 285, Section 3.1.26 [ClusterSpanner], page 289, Section 3.1.34 [DynamicLineSpanner], page 296, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.37 [Episema], page 299, Section 3.1.40 [Glissando], page 303, Section 3.1.41 [GraceSpacing], page 304, Section 3.1.44 [Hairpin], page 305, Section 3.1.46 [HorizontalBracket], page 307, Section 3.1.47 [InstrumentName], page 308, Section 3.1.53 [LedgerLineSpanner], page 313, Section 3.1.55 [LigatureBracket], page 314, Section 3.1.56 [LyricExtender], page 315, Section 3.1.57 [LyricHyphen], page 316, Section 3.1.58 [LyricSpace], page 317, Section 3.1.60 [MeasureGrouping], page 318, Section 3.1.62 [MensuralLigature], page 319, Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.74 [OttavaBracket], page 329, Section 3.1.77 [PercentRepeat], page 331, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.79 [PhrasingSlur], page 333, Section 3.1.80 [PianoPedalBracket], page 334, Section 3.1.90 [Slur], page 341, Section 3.1.92 [SostenutoPedalLineSpanner], page 343, Section 3.1.93 [SpacingSpanner], page 344, Section 3.1.95 [StaffGrouper], page 346, Section 3.1.97 [StaffSymbol], page 347,

Section 3.1.104 [SustainPedalLineSpanner], page 354, Section 3.1.105 [System], page 355, Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357, Section 3.1.109 [SystemStartSquare], page 358, Section 3.1.112 [TextSpanner], page 361, Section 3.1.113 [Tie], page 362, Section 3.1.114 [TieColumn], page 364, Section 3.1.119 [TrillSpanner], page 368, Section 3.1.120 [TupletBracket], page 369, Section 3.1.121 [TupletNumber], page 370, Section 3.1.123 [UnaCordaPedalLineSpanner], page 372, Section 3.1.124 [VaticanaLigature], page 373, Section 3.1.125 [VerticalAlignment], page 373, Section 3.1.126 [VerticalAxisGroup], page 373, Section 3.1.127 [VoiceFollower], page 375, Section 3.1.128 [VoltaBracket], page 376 and Section 3.1.129 [VoltaBracketSpanner], page 376.

### 3.2.97 staff-grouper-interface

A grob that collects staves together.

#### User settable properties:

`staff-staff-spacing` (list)
: When applied to a staff-group's `StaffGrouper` grob, this spacing alist controls the distance between consecutive staves within the staff-group. When applied to a staff's `VerticalAxisGroup` grob, it controls the distance between the staff and the nearest staff below it in the same system, replacing any settings inherited from the `StaffGrouper` grob of the containing staff-group, if there is one. This property remains in effect even when non-staff lines appear between staves. The alist can contain the following keys:

  - `padding` – the minimum required amount of unobstructed vertical whitespace between the two items, measured in staff-spaces.
  - `space` – 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.
  - `stretchability` – a unitless measure of the dimension's relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result).

`staffgroup-staff-spacing` (list)
: The spacing alist controlling the distance between the last staff of the current staff-group and the staff just below it in the same system, even if one or more non-staff lines exist between the two staves. If the `staff-staff-spacing` property of the staff's `VerticalAxisGroup` grob is set, that is used instead. See `staff-staff-spacing` for a description of the alist structure.

This grob interface is used in the following graphical object(s): Section 3.1.95 [StaffGrouper], page 346.

### 3.2.98 staff-spacing-interface

This object calculates spacing details from a breakable symbol (left) to another object. For example, it takes care of optical spacing from a bar line to a note.

### User settable properties:

`stem-spacing-correction` (number)
: Optical correction amount for stems that are placed in tight configurations. For opposite directions, this amount is the correction for two normal sized stems that overlap completely.

This grob interface is used in the following graphical object(s): Section 3.1.96 [StaffSpacing], page 347.

## 3.2.99 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:

`ledger-line-thickness` (pair of numbers)
: The thickness of ledger lines. It is the sum of 2 numbers: The first is the factor for line thickness, and the second for staff space. Both contributions are added.

`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)
: Line thickness, generally measured in `line-thickness`.

`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): Section 3.1.97 [StaffSymbol], page 347.

## 3.2.100 staff-symbol-referencer-interface

An object whose Y position is meant relative to a staff symbol. These usually have `Staff_symbol_referencer::callback` in their `Y-offset-callbacks`.

### User settable properties:

`staff-position` (number)
: Vertical position, measured in half staff spaces, counted from the middle line.

This grob interface is used in the following graphical object(s): Section 3.1.8 [Ambitus-NoteHead], page 275, Section 3.1.9 [Arpeggio], page 276, Section 3.1.19 [Beam], page 283, Section 3.1.25 [Clef], page 288, Section 3.1.29 [Custos], page 292, Section 3.1.31 [Dots], page 293, Section 3.1.49 [KeyCancellation], page 310, Section 3.1.50 [KeySignature], page 311, Section 3.1.64 [MultiMeasureRest], page 321, Section 3.1.70 [NoteHead], page 326, Section 3.1.85 [Rest], page 339, Section 3.1.110 [TabNoteHead], page 358 and Section 3.1.118 [TrillPitchHead], page 367.

### 3.2.101 stanza-number-interface

A stanza number, to be put in from of a lyrics line.

This grob interface is used in the following graphical object(s): Section 3.1.98 [StanzaNumber], page 348.

### 3.2.102 stem-interface

The stem represents the graphical stem. In addition, it internally connects note heads, beams, and tremolos. Rests and whole notes have invisible stems.

The following properties may be set in the `details` list.

`beamed-lengths`
: List of stem lengths given beam multiplicity.

`beamed-minimum-free-lengths`
: List of normal minimum free stem lengths (chord to beams) given beam multiplicity.

`beamed-extreme-minimum-free-lengths`
: List of extreme minimum free stem lengths (chord to beams) given beam multiplicity.

`lengths` Default stem lengths. The list gives a length for each flag count.

`stem-shorten`
: How much a stem in a forced direction should be shortened. The list gives an amount depending on the number of flags and beams.

### User settable properties:

`avoid-note-head` (boolean)
: If set, the stem of a chord does not pass through all note heads, but starts at the last note head.

`beaming` (pair)
: Pair of number lists. Each number list specifies which beams to make. `0` is the central beam, `1` is the next beam toward the note, etc. This information is used to determine how to connect the beaming patterns from stem to stem inside a beam.

`beamlet-default-length` (pair)
: A pair of numbers. The first number specifies the default length of a beamlet that sticks out of the left hand side of this stem; the second number specifies the default length of the beamlet to the right. The actual length of a beamlet is determined by taking either the default length or the length specified by `beamlet-max-length-proportion`, whichever is smaller.

`beamlet-max-length-proportion` (pair)
: The maximum length of a beamlet, as a proportion of the distance between two adjacent stems.

`default-direction` (direction)
: Direction determined by note head positions.

`details` (list)
: Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction)
: If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`duration-log` (integer)
: The 2-log of the note head duration, i.e., `0` = whole note, `1` = half note, etc.

`flag` (stencil)
: A function returning the full flag stencil for the `Stem`, which is passed to the function as the only argument. The default ly:stem::calc-stencil function uses the `flag-style` property to determine the correct glyph for the flag. By providing your own function, you can create arbitrary flags.

`flag-style` (symbol)
: A symbol determining what style of flag glyph is typeset on a `Stem`. Valid options include `'()` for standard flags, `'mensural` and `'no-flag`, which switches off the flag.

`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.

`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.

`stem-end-position` (number)
: Where does the stem end (the end is opposite to the support-head)?

`stemlet-length` (number)
: How long should be a stem over a rest?

`stroke-style` (string)
: Set to `"grace"` to turn stroke through flag on.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

### Internal properties:

`beam` (graphical (layout) object)
: A pointer to the beam, if applicable.

`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): Section 3.1.99 [Stem], page 348.

## 3.2.103 stem-tremolo-interface

A beam slashing a stem to indicate a tremolo. The property `style` can be `default` 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.

`flag-count` (number)
: The number of tremolo beams.

`length-fraction` (number)
: Multiplier for lengths. Used for determining ledger lines and stem lengths.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`slope` (number)
: The slope of this object.

### Internal properties:

`stem` (graphical (layout) object)
: A pointer to a `Stem` object.

This grob interface is used in the following graphical object(s): Section 3.1.100 [StemTremolo], page 350.

## 3.2.104 string-number-interface

A string number instruction.

This grob interface is used in the following graphical object(s): Section 3.1.101 [StringNumber], page 351.

### 3.2.105 stroke-finger-interface

A right hand finger instruction.

#### User settable properties:

`digit-names` (vector)
: Names for string finger digits.

This grob interface is used in the following graphical object(s): Section 3.1.102 [StrokeFinger], page 352.

### 3.2.106 system-interface

This is the top-level object: Each object in a score ultimately has a `System` object as its X and Y parent.

#### User settable properties:

`labels` (list)
: List of labels (symbols) placed on a column.

`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.

#### 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.

`pure-Y-extent` (pair of numbers)
: The estimated height of a system.

This grob interface is used in the following graphical object(s): Section 3.1.105 [System], page 355.

### 3.2.107 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)
: Line thickness, generally measured in `line-thickness`.

This grob interface is used in the following graphical object(s): Section 3.1.106 [SystemStartBar], page 355, Section 3.1.107 [SystemStartBrace], page 356, Section 3.1.108 [SystemStartBracket], page 357 and Section 3.1.109 [SystemStartSquare], page 358.

## 3.2.108 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.

`self-alignment-Y` (number)
: Like `self-alignment-X` but for the Y axis.

`text` (markup)
: Text markup. See Section "Formatting text" in *Notation Reference*.

This grob interface is used in the following graphical object(s): Section 3.1.47 [InstrumentName], page 308.

## 3.2.109 tab-note-head-interface

A note head in tablature.

### User settable properties:

`details` (list)
: Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

This grob interface is used in the following graphical object(s): Section 3.1.110 [TabNoteHead], page 358.

## 3.2.110 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.

`text` (markup)
: Text markup. See Section "Formatting text" in *Notation Reference*.

`word-space` (dimension, in staff space)
: Space to insert between words in texts.

`text-direction` (direction)
: This controls the ordering of the words. The default `RIGHT` is for roman text. Arabic or Hebrew should use `LEFT`.

This grob interface is used in the following graphical object(s): Section 3.1.10 [BalloonTextItem], page 277, Section 3.1.12 [BarNumber], page 279, Section 3.1.13 [BassFigure], page 281, Section 3.1.23 [BreathingSign], page 287, Section 3.1.24 [ChordName], page 287, Section 3.1.28 [CombineTextScript], page 290, Section 3.1.33 [DoublePercentRepeatCounter], page 294, Section 3.1.35 [DynamicText], page 297, Section 3.1.36 [DynamicTextSpanner], page 298, Section 3.1.38 [Fingering], page 300, Section 3.1.48 [InstrumentSwitch], page 309, Section 3.1.59 [LyricText], page 317, Section 3.1.63 [MetronomeMark], page 320, Section 3.1.65 [MultiMeasureRestNumber], page 322, Section 3.1.66 [MultiMeasureRestText], page 323, Section 3.1.71 [NoteName], page 327, Section 3.1.73 [OctavateEight], page 328, Section 3.1.74 [OttavaBracket], page 329, Section 3.1.78 [PercentRepeatCounter], page 332, Section 3.1.81 [RehearsalMark], page 335, Section 3.1.91 [SostenutoPedal], page 342, Section 3.1.98 [StanzaNumber], page 348, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352, Section 3.1.103 [SustainPedal], page 353, Section 3.1.110 [TabNoteHead], page 358, Section 3.1.111 [TextScript], page 360, Section 3.1.121 [TupletNumber], page 370, Section 3.1.122 [UnaCordaPedal], page 371 and Section 3.1.128 [VoltaBracket], page 376.

## 3.2.111 text-script-interface

An object that is put above or below a note.

### User settable properties:

`add-stem-support` (boolean)
: If set, the `Stem` object is included in this script's support.

`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 sorting key that determines in what order a script is within a stack of scripts.

### Internal properties:

`slur` (graphical (layout) object)
: A pointer to a `Slur` object.

This grob interface is used in the following graphical object(s): Section 3.1.28 [CombineTextScript], page 290, Section 3.1.38 [Fingering], page 300, Section 3.1.101 [StringNumber], page 351, Section 3.1.102 [StrokeFinger], page 352 and Section 3.1.111 [TextScript], page 360.

### 3.2.112 tie-column-interface

Object that sets directions of multiple ties in a tied chord.

#### User settable properties:

`tie-configuration` (list)
: List of `(`*`position . dir`*`)` pairs, indicating the desired tie configuration, where *position* is the offset from the center of the staff in staff space and *dir* indicates the direction of the tie (`1`=>up, `-1`=>down, `0`=>center). A non-pair entry in the list causes the corresponding tie to be formatted automatically.

#### Internal properties:

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.114 [TieColumn], page 364.

### 3.2.113 tie-interface

A horizontal curve connecting two noteheads.

#### User settable properties:

`annotation` (string)
: Annotate a grob for debug purposes.

`avoid-slur` (symbol)
: Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

`control-points` (list)
: List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

`dash-definition` (pair)
: List of `dash-elements` defining the dash structure. Each `dash-element` has a starting t value, an ending t-value, a `dash-fraction`, and a `dash-period`.

`details` (list)
: Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`direction` (direction)
: If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`head-direction` (direction)
: Are the note heads left or right in a semitie?

`line-thickness` (number)
: The thickness of the tie or slur contour.

`neutral-direction` (direction)
: Which direction to take in the center of the staff.

`staff-position` (number)
: Vertical position, measured in half staff spaces, counted from the middle line.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

### Internal properties:

`quant-score` (string)
: The beam quanting score; stored for debugging.

This grob interface is used in the following graphical object(s): Section 3.1.113 [Tie], page 362.

## 3.2.114 time-signature-interface

A time signature, in different styles. The following values for `style` are are recognized:

`C` 4/4 and 2/2 are typeset as C and struck C, respectively. All other time signatures are written with two digits. The value `default` is equivalent to `C`.

`neomensural`
: 2/2, 3/2, 2/4, 3/4, 4/4, 6/4, 9/4, 4/8, 6/8, and 9/8 are typeset with neo-mensural style mensuration marks. All other time signatures are written with two digits.

`mensural` 2/2, 3/2, 2/4, 3/4, 4/4, 6/4, 9/4, 4/8, 6/8, and 9/8 are typeset with mensural style mensuration marks. All other time signatures are written with two digits.

`single-digit`
: All time signatures are typeset with a single digit, e.g., 3/2 is written as 3.

`numbered` All time signatures are typeset with two digits.

### User settable properties:

`fraction` (pair of numbers)
: Numerator and denominator of a time signature object.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

This grob interface is used in the following graphical object(s): Section 3.1.115 [TimeSignature], page 364.

### 3.2.115 trill-pitch-accidental-interface

An accidental for trill pitch.

This grob interface is used in the following graphical object(s): Section 3.1.116 [TrillPitchAccidental], page 365.

### 3.2.116 trill-spanner-interface

A trill spanner.

This grob interface is used in the following graphical object(s): Section 3.1.119 [TrillSpanner], page 368.

### 3.2.117 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:

`bracket-flare` (pair of numbers)
: A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`bracket-visibility` (boolean or symbol)
: This controls the visibility of the tuplet bracket. Setting it to false prevents printing of the bracket. Setting the property to `if-no-beam` makes it print only if there is no beam associated with this tuplet bracket.

`break-overshoot` (pair of numbers)
: How much does a broken spanner stick out of its bounds?

`connect-to-neighbor` (pair)
: Pair of booleans, indicating whether this grob looks as a continued break.

`control-points` (list)
: 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.

`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.

`positions` (pair of numbers)
: Pair of staff coordinates `(left . right)`, where both *left* and *right* are in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`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 a text-spanner on both sides, for example a pedal bracket. Positive values shorten the text-spanner, while negative values lengthen it.

`staff-padding` (dimension, in staff space)
: Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

### Internal properties:

`note-columns` (array of grobs)
: An array of `NoteColumn` grobs.

`tuplet-number` (graphical (layout) object)
: The number for a bracket.

`tuplets` (array of grobs)
: An array of smaller tuplet brackets.

This grob interface is used in the following graphical object(s): Section 3.1.55 [Ligature-Bracket], page 314 and Section 3.1.120 [TupletBracket], page 369.

## 3.2.118 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`.

### Internal properties:

`bracket` (graphical (layout) object)
: The bracket for a number.

This grob interface is used in the following graphical object(s): Section 3.1.121 [TupletNumber], page 370.

## 3.2.119 unbreakable-spanner-interface

A spanner that should not be broken across line breaks. Override with `breakable=##t`.

### User settable properties:

`breakable` (boolean)
: Allow breaks here.

This grob interface is used in the following graphical object(s): Section 3.1.19 [Beam], page 283 and Section 3.1.40 [Glissando], page 303.

## 3.2.120 vaticana-ligature-interface

A vaticana style Gregorian ligature.

### User settable properties:

`glyph-name` (string)
: The glyph name within the font.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

### Internal properties:

`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 (in `staff-space` units).

`add-cauda` (boolean)
: Does this flexa require an additional cauda on the left side?

`add-stem` (boolean)
: Is this ligature head a virga and therefore needs an additional stem on the right side?

`add-join` (boolean)
: Is this ligature head-joined with the next one by a vertical line?

`delta-position` (number)
: The vertical position difference.

`x-offset` (dimension, in staff space)
: Extra horizontal offset for ligature heads.

This grob interface is used in the following graphical object(s): Section 3.1.70 [NoteHead], page 326 and Section 3.1.124 [VaticanaLigature], page 373.

## 3.2.121 volta-bracket-interface

Volta bracket with number.

### User settable properties:

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

`height` (dimension, in staff space)
: Height of an object in `staff-space` units.

### Internal properties:

`bars` (array of grobs)
: An array of bar line pointers.

This grob interface is used in the following graphical object(s): Section 3.1.128 [VoltaBracket], page 376.

### 3.2.122 volta-interface

A volta repeat.

This grob interface is used in the following graphical object(s): Section 3.1.128 [VoltaBracket], page 376 and Section 3.1.129 [VoltaBracketSpanner], page 376.

## 3.3 User backend properties

`add-stem-support` (boolean)
: If set, the `Stem` object is included in this script's support.

`after-line-breaking` (boolean)
: Dummy property, used to trigger callback for `after-line-breaking`.

`align-dir` (direction)
: Which side to align? `-1`: left side, `0`: around center of width, `1`: right side.

`allow-loose-spacing` (boolean)
: If set, column can be detached from main spacing.

`allow-span-bar` (boolean)
: If false, no inter-staff bar line will be created below this bar line.

`alteration` (number)
: Alteration numbers for accidental.

`alteration-alist` (list)
: List of `(`*`pitch . accidental`*`)` pairs for key signature.

`annotation` (string)
: Annotate a grob for debug purposes.

`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 that is larger than this number, make a kneed beam.

`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-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-size` (dimension, in staff space)
: The size of a bar line.

`base-shortest-duration` (moment)
: Spacing is based on the shortest notes in a piece. Normally, pieces are spaced as if notes at least as short as this are present.

`baseline-skip` (dimension, in staff space)
: Distance between base lines of multiple lines of text.

`beam-thickness` (dimension, in staff space)
: Beam thickness, measured in `staff-space` units.

`beam-width` (dimension, in staff space)
: Width of the tremolo sign.

`beamed-stem-shorten` (list)
: How much to shorten beamed stems, when their direction is forced. It is a list, since the value is different depending on the number of flags and beams.

`beaming` (pair)
: Pair of number lists. Each number list specifies which beams to make. `0` is the central beam, `1` is the next beam toward the note, etc. This information is used to determine how to connect the beaming patterns from stem to stem inside a beam.

`beamlet-default-length` (pair)
: A pair of numbers. The first number specifies the default length of a beamlet that sticks out of the left hand side of this stem; the second number specifies the default length of the beamlet to the right. The actual length of a beamlet is determined by taking either the default length or the length specified by `beamlet-max-length-proportion`, whichever is smaller.

`beamlet-max-length-proportion` (pair)
: The maximum length of a beamlet, as a proportion of the distance between two adjacent stems.

`before-line-breaking` (boolean)
: Dummy property, used to trigger a callback function.

`between-cols` (pair)
: Where to attach a loose column to.

`bound-details` (list)
: An alist of properties for determining attachments of spanners to edges.

`bound-padding` (number)
: The amount of padding to insert around spanner bounds.

`bracket-flare` (pair of numbers)
: A pair of numbers specifying how much edges of brackets should slant outward. Value `0.0` means straight edges.

`bracket-visibility` (boolean or symbol)
: This controls the visibility of the tuplet bracket. Setting it to false prevents printing of the bracket. Setting the property to `if-no-beam` makes it print only if there is no beam associated with this tuplet bracket.

`break-align-anchor` (number)
: Grobs aligned to this break-align grob 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)
: Defines the order in which prefatory matter (clefs, key signatures) appears. The format is a vector of length 3, where each element is one order for end-of-line, middle of line, and start-of-line, respectively. An order is a list of symbols.

  For example, clefs are put after key signatures by setting

```
\override Score.BreakAlignment #'break-align-orders =
  #(make-vector 3 '(span-bar
                    breathing-sign
                    staff-bar
                    key
                    clef
                    time-signature))
```

`break-align-symbol` (symbol)
: This key is used for aligning and spacing breakable items.

`break-align-symbols` (list)
: A list of symbols that determine which break-aligned grobs 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 `left-edge`, `ambitus`, `breathing-sign`, `clef`, `staff-bar`, `key-cancellation`, `key-signature`, `time-signature`, and `custos`.

`break-overshoot` (pair of numbers)
: How much does a broken spanner stick out of its bounds?

`break-visibility` (vector)
: A vector of 3 booleans, `#(`*`end-of-line unbroken begin-of-line`*`)`. `#t` means visible, `#f` means killed.

`breakable` (boolean)
: Allow breaks here.

`c0-position` (integer)
: An integer indicating the position of middle C.

`circled-tip` (boolean)
: Put a circle at start/end of hairpins (al/del niente).

`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.

`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)
: 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.

`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 `0.0` (no line) and `1.0` (continuous line).

`dash-period` (number)
: The length of one dash together with whitespace. If negative, no line is drawn at all.

`default-direction` (direction)
: Direction determined by note head positions.

`default-staff-staff-spacing` (list)
: The settings to use for `staff-staff-spacing` when it is unset, for ungrouped staves and for grouped staves that do not have the relevant `StaffGrouper` property set (`staff-staff-spacing` or `staffgroup-staff-spacing`).

`details` (list)
: Alist of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

`digit-names` (vector)
: Names for string finger digits.

`direction` (direction)
: If `side-axis` is `0` (or `#X`), then this property determines whether the object is placed `#LEFT`, `#CENTER` or `#RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `#UP`, `#CENTER` or `#DOWN`. Numerical values may also be used: `#UP=1`, `#DOWN=-1`, `#LEFT=-1`, `#RIGHT=1`, `#CENTER=0`.

`dot-count` (integer)
: The number of dots.

`dot-negative-kern` (number)
: The space to remove between a dot and a slash in percent repeat glyphs. Larger values bring the two elements closer together.

`dot-placement-list` (list)
: List consisting of `(`*`description string-number fret-number finger-number`*`)` entries used to define fret diagrams.

`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`*`)`.

`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)`.

`extra-X-extent` (pair of numbers)
: A grob is enlarged in X dimension by this much.

`extra-Y-extent` (pair of numbers)
: A grob is enlarged in Y dimension by this much.

`flag` (stencil)
: A function returning the full flag stencil for the `Stem`, which is passed to the function as the only argument. The default ly:stem::calc-stencil function uses the `flag-style` property to determine the correct glyph for the flag. By providing your own function, you can create arbitrary flags.

`flag-count` (number)
: The number of tremolo beams.

`flag-style` (symbol)
: A symbol determining what style of flag glyph is typeset on a `Stem`. Valid options include `'()` for standard flags, `'mensural` and `'no-flag`, which switches off the flag.

`font-encoding` (symbol)
: The font encoding is the broadest category for selecting a font. Currently, only lilypond's system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

`font-family` (symbol)
: The font family is the broadest category for selecting text fonts. Options include: `sans`, `roman`.

`font-name` (string)
: Specifies a file name (without extension) of the font to load. This setting overrides selection using `font-family`, `font-series` and `font-shape`.

`font-series` (symbol)
: Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

`font-shape` (symbol)
: Select the shape of a font. Choices include `upright`, `italic`, `caps`.

`font-size` (number)
: The font size, compared to the 'normal' size. `0` is style-sheet's normal size, `-1` is smaller, `+1` is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. Fractional values are allowed.

`force-hshift` (number)
: This specifies a manual shift for notes in collisions. The unit is the note head width of the first voice note. This is used by Section "note-collision-interface" in *Internals Reference*.

`fraction` (pair of numbers)
: Numerator and denominator of a time signature object.

`french-beaming` (boolean)
: Use French beaming style for this stem. The stem stops at the innermost beams.

`fret-diagram-details` (list)
: An alist of detailed grob properties for fret diagrams. Each alist entry consists of a `(`*`property . value`*`)` pair. The properties which can be included in `fret-diagram-details` include the following:

  - `barre-type` – Type of barre indication used. Choices include `curved`, `straight`, and `none`. Default `curved`.
  - `capo-thickness` – Thickness of capo indicator, in multiples of fret-space. Default value 0.5.
  - `dot-color` – Color of dots. Options include `black` and `white`. Default `black`.

- `dot-label-font-mag` – Magnification for font used to label fret dots. Default value 1.
- `dot-position` – Location of dot in fret space. Default 0.6 for dots without labels, 0.95-`dot-radius` for dots with labels.
- `dot-radius` – Radius of dots, in terms of fret spaces. Default value 0.425 for labeled dots, 0.25 for unlabeled dots.
- `finger-code` – Code for the type of fingering indication used. Options include `none`, `in-dot`, and `below-string`. Default `none` for markup fret diagrams, `below-string` for `FretBoards` fret diagrams.
- `fret-count` – The number of frets. Default 4.
- `fret-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.
- `label-dir` – Side to which the fret label is attached. `-1`, `#LEFT`, or `#DOWN` for left or down; `1`, `#RIGHT`, or `#UP` for right or up. Default `#RIGHT`.
- `mute-string` – Character string to be used to indicate muted string. Default `"x"`.
- `number-type` – Type of numbers to use in fret label. Choices include `roman-lower`, `roman-upper`, and `arabic`. 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-label-font-mag` – The magnification of the font used to label fingerings at the string, rather than in the dot. Default value 0.6 for `normal` orientation, 0.5 for `landscape` and `opposing-landscape`.
- `string-thickness-factor` – Factor for changing thickness of each string in the fret diagram. Thickness of string $k$ is given by `thickness` * (1+`string-thickness-factor`) ^ ($k$-1). Default 0.
- `top-fret-thickness` – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.
- `xo-font-magnification` – Magnification used for mute and open string indicators. Default value 0.5.
- `xo-padding` – Padding for open and mute indicators from top fret. Default value 0.25.

`full-length-padding` (number)
: How much padding to use at the right side of a full-length tuplet bracket.

`full-length-to-extent` (boolean)
: Run to the extent of the column for a full-length tuplet bracket.

`full-measure-extra-space` (number)
: Extra space that is allocated at the beginning of a measure with only one note. This property is read from the NonMusicalPaperColumn that begins the measure.

`full-size-change` (boolean)
: Don't make a change clef smaller.

`gap` (dimension, in staff space)
: Size of a gap in a variable symbol.

`gap-count` (integer)
: Number of gapped beams for tremolo.

`glyph` (string)
: A string determining what 'style' of glyph is typeset. Valid choices depend on the function that is reading this property.

`glyph-name` (string)
: The glyph name within the font.

`glyph-name-alist` (list)
: An alist of key-string pairs.

`graphical` (boolean)
: Display in graphical (vs. text) form.

`grow-direction` (direction)
: Crescendo or decrescendo?

`hair-thickness` (number)
: Thickness of the thin line in a bar line.

`harp-pedal-details` (list)
: An alist of detailed grob properties for harp pedal diagrams. Each alist entry consists of a `(property . value)` pair. The properties which can be included in harp-pedal-details include the following:

  - `box-offset` – Vertical shift of the center of flat/sharp pedal boxes above/below the horizontal line. Default value 0.8.
  - `box-width` – Width of each pedal box. Default value 0.4.
  - `box-height` – Height of each pedal box. Default value 1.0.
  - `space-before-divider` – Space between boxes before the first divider (so that the diagram can be made symmetric). Default value 0.8.
  - `space-after-divider` – Space between boxes after the first divider. Default value 0.8.
  - `circle-thickness` – Thickness (in unit of the line-thickness) of the ellipse around circled pedals. Default value 0.5.
  - `circle-x-padding` – Padding in X direction of the ellipse around circled pedals. Default value 0.15.
  - `circle-y-padding` – Padding in Y direction of the ellipse around circled pedals. Default value 0.2.

`head-direction` (direction)
: Are the note heads left or right in a semitie?

`height` (dimension, in staff space)
: Height of an object in `staff-space` units.

`height-limit` (dimension, in staff space)
: Maximum slur height: The longer the slur, the closer it is to this height.

`hide-tied-accidental-after-break` (boolean)
: If set, an accidental that appears on a tied note after a line break will not be displayed.

`horizontal-shift` (integer)
: An integer that identifies ranking of `NoteColumn`s 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.

`ignore-collision` (boolean)
: If set, don't do note collision resolution on this `NoteColumn`.

`implicit` (boolean)
: Is this an implicit bass figure?

`inspect-index` (integer)
: If debugging is set, set beam and slur configuration to this index, and print the respective scores.

`inspect-quants` (pair of numbers)
: If debugging is set, set beam and slur quants to this position, and print the respective scores.

`keep-inside-line` (boolean)
: If set, this column cannot have objects sticking into the margin.

`kern` (dimension, in staff space)
: Amount of extra white space to add. For bar lines, this is the amount of space after a thick line.

`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.

`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-line-thickness` (pair of numbers)
: The thickness of ledger lines. It is the sum of 2 numbers: The first is the factor for line thickness, and the second for staff space. Both contributions are added.

`left-bound-info` (list)
: An alist of properties for determining attachments of spanners to edges.

`left-padding` (dimension, in staff space)
: The amount of space that is put left to an object (e.g., a lyric extender).

`length` (dimension, in staff space)
: User override for the stem length of unbeamed stems.

`length-fraction` (number)
: Multiplier for lengths. Used for determining ledger lines and stem lengths.

`line-break-penalty` (number)
: Penalty for a line break at this column. This affects the choices of the line breaker; it avoids a line break at a column with a positive penalty and prefers a line break at a column with a negative penalty.

`line-break-permission` (symbol)
: Instructs the line breaker on whether to put a line break at this column. Can be `force` or `allow`.

`line-break-system-details` (list)
: An alist of properties to use if this column is the start of a system.

`line-count` (integer)
: The number of staff lines.

`line-positions` (list)
: Vertical positions of staff lines.

`line-thickness` (number)
: The thickness of the tie or slur contour.

`long-text` (markup)
: Text markup. See Section "Formatting text" in *Notation Reference*.

`max-beam-connect` (integer)
: Maximum number of beams to connect to beams from this stem. Further beams are typeset as beamlets.

`max-stretch` (number)
: The maximum amount that this `VerticalAxisGroup` can be vertically stretched (for example, in order to better fill a page).

`measure-count` (integer)
: The number of measures for a multi-measure rest.

`measure-length` (moment)
: Length of a measure. Used in some spacing situations.

`merge-differently-dotted` (boolean)
: Merge note heads in collisions, even if they have a different number of dots. This is normal notation for some types of polyphonic music.

  `merge-differently-dotted` only applies to opposing stem directions (i.e., voice 1 & 2).

`merge-differently-headed` (boolean)
: Merge note heads in collisions, even if they have different note heads. The smaller of the two heads is rendered invisible. This is used in polyphonic guitar notation. The value of this setting is used by Section "note-collision-interface" in *Internals Reference*.

  `merge-differently-headed` only applies to opposing stem directions (i.e., voice 1 & 2).

`minimum-distance` (dimension, in staff space)
: Minimum distance between rest and notes or beam.

`minimum-length` (dimension, in staff space)
: Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

`minimum-length-fraction` (number)
: Minimum length of ledger line as fraction of note head size.

`minimum-space` (dimension, in staff space)
: Minimum distance that the victim should move (after padding).

`minimum-X-extent` (pair of numbers)
: Minimum size of an object in X dimension, measured in `staff-space` units.

`minimum-Y-extent` (pair of numbers)
: Minimum size of an object in Y dimension, measured in `staff-space` units.

`neutral-direction` (direction)
: Which direction to take in the center of the staff.

`neutral-position` (number)
: Position (in half staff spaces) where to flip the direction of custos stem.

`next` (graphical (layout) object)
: Object that is next relation (e.g., the lyric syllable following an extender).

`no-alignment` (boolean)
: If set, don't place this grob in a `VerticalAlignment`; rather, place it using its own `Y-offset` callback.

`no-ledgers` (boolean)
: If set, don't draw ledger lines on this object.

`no-stem-extend` (boolean)
: If set, notes with ledger lines do not get stems extending to the middle staff line.

`non-break-align-symbols` (list)
: A list of symbols that determine which NON-break-aligned interfaces to align this to.

`non-default` (boolean)
: Set for manually specified clefs.

`non-musical` (boolean)
: True if the grob belongs to a `NonMusicalPaperColumn`.

`nonstaff-nonstaff-spacing` (list)
: The spacing alist controlling the distance between the current non-staff line and the next non-staff line in the direction of `staff-affinity`, if both are on the same side of the related staff, and `staff-affinity` is either `UP` or `DOWN`. See `staff-staff-spacing` for a description of the alist structure.

`nonstaff-relatedstaff-spacing` (list)
: The spacing alist controlling the distance between the current non-staff line and the nearest staff in the direction of `staff-affinity`, if there are no non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. If `staff-affinity` is `CENTER`, then `nonstaff-relatedstaff-spacing` is used for the nearest staves on *both* sides, even if other non-staff lines appear between the current one and either of the staves. See `staff-staff-spacing` for a description of the alist structure.

`nonstaff-unrelatedstaff-spacing` (list)
: The spacing alist controlling the distance between the current non-staff line and the nearest staff in the opposite direction from `staff-affinity`, if there are no other non-staff lines between the two, and `staff-affinity` is either `UP` or `DOWN`. See `staff-staff-spacing` for a description of the alist structure.

`note-names` (vector)
: Vector of strings containing names for easy-notation note heads.

`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 this grob and the staff when spacing according to `outside-staff-priority`.

`outside-staff-priority` (number)
: If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`packed-spacing` (boolean)
: If set, the notes are spaced as tightly as possible.

`padding` (dimension, in staff space)
: Add this much extra space between objects that are next to each other.

`padding-pairs` (list)
: An alist mapping `(`*`name . name`*`)` to distances.

`page-break-penalty` (number)
: Penalty for page break at this column. This affects the choices of the page breaker; it avoids a page break at a column with a positive penalty and prefers a page break at a column with a negative penalty.

`page-break-permission` (symbol)
: Instructs the page breaker on whether to put a page break at this column. Can be `force` or `allow`.

`page-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`.

`parenthesized` (boolean)
: Parenthesize this grob.

`positions` (pair of numbers)
: Pair of staff coordinates `(`*`left . right`*`)`, where both *left* and *right* are in `staff-space` units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

`prefer-dotted-right` (boolean)
: For note collisions, prefer to shift dotted up-note to the right, rather than shifting just the dot.

`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?

`restore-first` (boolean)
: Print a natural before the accidental.

`rhythmic-location` (rhythmic location)
: Where (bar number, measure position) in the score.

`right-bound-info` (list)
: An alist of properties for determining attachments of spanners to edges.

`right-padding` (dimension, in staff space)
: Space to insert on the right side of an object (e.g., between note and its accidentals).

`rotation` (list)
: Number of degrees to rotate this object, and what point to rotate around. For example, `#'(45 0 0)` rotates by 45 degrees around the center of this object.

`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 sorting key that determines in what order a script is within a stack of scripts.

`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.

`self-alignment-Y` (number)
: Like `self-alignment-X` but for the Y axis.

`shorten-pair` (pair of numbers)
: The lengths to shorten a text-spanner on both sides, for example a pedal bracket. Positive values shorten the text-spanner, while negative values lengthen it.

`shortest-duration-space` (dimension, in staff space)
: Start with this much space for the shortest duration. This is expressed in `spacing-increment` as unit. See also Section "spacing-spanner-interface" in *Internals Reference*.

`shortest-playing-duration` (moment)
: The duration of the shortest note playing here.

`shortest-starter-duration` (moment)
: The duration of the shortest note that starts here.

`side-axis` (number)
: If the value is `#X` (or equivalently `0`), the object is placed horizontally next to the other object. If the value is `#Y` or `1`, it is placed vertically.

`side-relative-direction` (direction)
: Multiply direction of `direction-source` with this to get the direction of this object.

`size` (number)
: Size of object, relative to standard size.

`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.

`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.

`space-alist` (list)
: A table that specifies distances between prefatory items, like clef and time-signature. The format is an alist of spacing tuples: `(`*`break-align-symbol type . distance`*`)`, where *type* can be the symbols `minimum-space` or `extra-space`.

`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` (number)
: Add this much space for a doubled duration. 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 `BreakAlignment`s.

  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)
: Dummy variable for triggering spacing routines.

`stacking-dir` (direction)
: Stack objects in which direction?

`staff-affinity` (direction)
: The direction of the staff to use for spacing the current non-staff line. Choices are `UP`, `DOWN`, and `CENTER`. If `CENTER`, the non-staff line will be placed equidistant between the two nearest staves on either side, unless collisions or other spacing constraints prevent this. Setting `staff-affinity` for a staff causes it to be treated as a non-staff line. Setting `staff-affinity` to `#f` causes a non-staff line to be treated as a staff.

`staff-padding` (dimension, in staff space)
: Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

`staff-position` (number)
: Vertical position, measured in half staff spaces, counted from the middle line.

`staff-space` (dimension, in staff space)
: Amount of space between staff lines, expressed in global `staff-space`.

`staff-staff-spacing` (list)
: When applied to a staff-group's `StaffGrouper` grob, this spacing alist controls the distance between consecutive staves within the staff-group. When applied to a staff's `VerticalAxisGroup` grob, it controls the distance between the staff and the nearest staff below it in the same system, replacing any settings inherited from the `StaffGrouper` grob of the containing staff-group, if there is one. This property remains in effect even when non-staff lines appear between staves. The alist can contain the following keys:

  - `padding` – the minimum required amount of unobstructed vertical whitespace between the two items, measured in staff-spaces.
  - `space` – 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.
  - `stretchability` – a unitless measure of the dimension's relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result).

`staffgroup-staff-spacing` (list)
: The spacing alist controlling the distance between the last staff of the current staff-group and the staff just below it in the same system, even if one or more non-staff lines exist between the two staves. If the `staff-staff-spacing` property of the staff's `VerticalAxisGroup` grob is set, that is used instead. See `staff-staff-spacing` for a description of the alist structure.

`stem-attachment` (pair of numbers)
: An `(x . y)` pair where the stem attaches to the notehead.

`stem-end-position` (number)
: Where does the stem end (the end is opposite to the support-head)?

`stem-spacing-correction` (number)
: Optical correction amount for stems that are placed in tight configurations. For opposite directions, this amount is the correction for two normal sized stems that overlap completely.

`stemlet-length` (number)
: How long should be a stem over a rest?

`stencil` (stencil)
: The symbol to print.

`stencils` (list)
: Multiple stencils, used as intermediate value.

`strict-grace-spacing` (boolean)
: If set, main notes are spaced normally, then grace notes are put left of the musical columns for the main notes.

`strict-note-spacing` (boolean)
: If set, unbroken columns with non-musical material (clefs, bar lines, etc.) are not spaced separately, but put before musical columns.

`stroke-style` (string)
: Set to `"grace"` to turn stroke through flag on.

`style` (symbol)
: This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

`text` (markup)
: Text markup. See Section "Formatting text" in *Notation Reference*.

`text-direction` (direction)
: This controls the ordering of the words. The default `RIGHT` is for roman text. Arabic or Hebrew should use `LEFT`.

`thick-thickness` (number)
: Bar line thickness, measured in `line-thickness`.

`thickness` (number)
: Line thickness, generally measured in `line-thickness`.

`thin-kern` (number)
: The space after a hair-line in a bar line.

`tie-configuration` (list)
: List of `(`*`position . dir`*`)` pairs, indicating the desired tie configuration, where *position* is the offset from the center of the staff in staff space and *dir* indicates the direction of the tie (`1`=>up, `-1`=>down, `0`=>center). A non-pair entry in the list causes the corresponding tie to be formatted automatically.

`to-barline` (boolean)
: If true, the spanner will stop at the bar line just before it would otherwise stop.

`toward-stem-shift` (number)
: Amount by which scripts are shifted toward the stem if their direction coincides with the stem direction. `0.0` means keep the default position (centered on the note head), `1.0` means centered on the stem. Interpolated values are possible.

`transparent` (boolean)
: This makes the grob invisible.

`uniform-stretching` (boolean)
: If set, items stretch proportionally to their durations. This looks better in complex polyphonic patterns.

`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.

`when` (moment)
: Global time step associated with this column happen?

`whiteout` (boolean)
: If true, the grob is printed over a white background to white-out underlying material, if the grob is visible. Usually #f by default.

`width` (dimension, in staff space)
: The width of a grob measured in staff space.

`word-space` (dimension, in staff space)
: Space to insert between words in texts.

`X-extent` (pair of numbers)
: Hard coded extent in X direction.

`X-offset` (number)
: The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers)
: Hard coded extent in Y direction.

`Y-offset` (number)
: The vertical amount that this object is moved relative to its Y-parent.

`zigzag-length` (dimension, in staff space)
: The length of the lines of a zigzag, relative to `zigzag-width`. A value of `1` gives 60-degree zigzags.

`zigzag-width` (dimension, in staff space)
: The width of one zigzag squiggle. This number is adjusted slightly so that the glissando line can be constructed from a whole number of squiggles.

## 3.4 Internal backend properties

`accidental-grob` (graphical (layout) object)
: The accidental for this note.

`accidental-grobs` (list)
: An alist with `(`*`notename . groblist`*`)` entries.

`add-cauda` (boolean)
: Does this flexa require an additional cauda on the left side?

`add-join` (boolean)
: Is this ligature head-joined with the next one by a vertical line?

`add-stem` (boolean)
: Is this ligature head a virga and therefore needs an additional stem on the right side?

`adjacent-pure-heights` (pair)
: A pair of vectors. Used by a `VerticalAxisGroup` to cache the `Y-extent`s 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.

`arpeggio` (graphical (layout) object)
: A pointer to an `Arpeggio` object.

`ascendens` (boolean)
: Is this neume of ascending type?

`auctum` (boolean)
: Is this neume liquescentically augmented?

`axis-group-parent-X` (graphical (layout) object)
: Containing X axis group.

`axis-group-parent-Y` (graphical (layout) object)
: Containing Y axis group.

`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.

`bars` (array of grobs)
: An array of bar line pointers.

`beam` (graphical (layout) object)
: A pointer to the beam, if applicable.

`begin-of-line-visible` (boolean)
: Set to make `ChordName` or `FretBoard` be visible only at beginning of line or at chord changes.

`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.

`cause` (any type)
: Any kind of causation objects (i.e., music, or perhaps translator) that was the cause for this grob.

`cavum` (boolean)
: Is this neume outlined?

`columns` (array of grobs)
: An array of grobs, typically containing `PaperColumn` or `NoteColumn` objects.

`conditional-elements` (array of grobs)
: Internal use only.

`context-info` (integer)
: Within a ligature, the final glyph or shape of a head may be affected by the left and/or right neighbour head. `context-info` holds for each head such information about the left and right neighbour, encoded as a bit mask.

`cross-staff` (boolean)
: For a beam or a stem, this is true if we depend on inter-staff spacing.

`delta-position` (number)
: The vertical position difference.

`deminutum` (boolean)
: Is this neume deminished?

`descendens` (boolean)
: Is this neume of descendent type?

`direction-source` (graphical (layout) object)
: In case `side-relative-direction` is set, which grob to get the direction from.

`dot` (graphical (layout) object)
: A reference to a `Dots` object.

`dots` (array of grobs)
: Multiple `Dots` objects.

`elements` (array of grobs)
: An array of grobs; the type is depending on the grob where this is set in.

`encompass-objects` (array of grobs)
: Objects that a slur should avoid in addition to notes and stems.

`figures` (array of grobs)
: Figured bass objects for continuation line.

`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 (in `staff-space` units).

`font` (font metric)
: A cached font metric object.

`forced` (boolean)
: Manually forced accidental.

`grace-spacing` (graphical (layout) object)
: A run of grace notes.

`head-width` (dimension, in staff space)
: The width of this ligature head.

`heads` (array of grobs)
: An array of note heads.

`ideal-distances` (list)
: `(`*`obj`* `. (`*`dist`* `. `*`strength`*`))` pairs.

`important-column-ranks` (vector)
: A cache of columns that contain `items-worth-living` data.

`inclinatum` (boolean)
: Is this neume an inclinatum?

`interfaces` (list)
: A list of symbols indicating the interfaces supported by this object. It is initialized from the `meta` field.

`items-worth-living` (array of grobs)
: An array of interesting items. If empty in a particular staff, then that staff is erased.

`join-right-amount` (number)
: A length used for calculating the Y-extent of mensural ligatures.

`keep-alive-with` (array of grobs)
: An array of other `VerticalAxisGroup`s. If any of them are alive, then we will stay alive.

`least-squares-dy` (number)
: The ideal beam slope, without damping.

`left-items` (array of grobs)
: DOCME

`left-neighbor` (graphical (layout) object)
: The right-most column that has a spacing-wish for this column.

`linea` (boolean)
: Attach vertical lines to this neume?

`maybe-loose` (boolean)
: Used to mark a breakable column that is loose if and only if it is in the middle of a line.

`meta` (list)
: Provide meta information. It is an alist with the entries `name` and `interfaces`.

`minimum-distances` (list)
: A list of rods that have the format `(obj . dist)`.

`normal-stems` (array of grobs)
: An array of visible stems.

`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.

`oriscus` (boolean)
: Is this neume an oriscus?

`pedal-text` (graphical (layout) object)
: A pointer to the text of a mixed-style piano pedal.

`pes-or-flexa` (boolean)
: Shall this neume be joined with the previous head?

`positioning-done` (boolean)
: Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

`prefix-set` (number)
: A bit mask that holds all Gregorian head prefixes, such as `\virga` or `\quilisma`.

`primitive` (integer)
: A pointer to a ligature primitive, i.e., an item similar to a note head that is part of a ligature.

`pure-relevant-grobs` (array of grobs)
: All the grobs (items and spanners) that are relevant for finding the `pure-Y-extent`

`pure-relevant-items` (array of grobs)
: A subset of elements that are relevant for finding the `pure-Y-extent`.

`pure-relevant-spanners` (array of grobs)
: A subset of elements that are relevant for finding the `pure-Y-extent`.

`pure-Y-common` (graphical (layout) object)
: A cache of the `common_refpoint_of_array` of the `elements` grob set.

`pure-Y-extent` (pair of numbers)
: The estimated height of a system.

`pure-Y-offset-in-progress` (boolean)
: A debugging aid for catching cyclic dependencies.

`quant-score` (string)
: The beam quanting score; stored for debugging.

`quantize-position` (boolean)
: If set, a vertical alignment is aligned to be within staff spaces.

`quantized-positions` (pair of numbers)
: The beam positions after quanting.

`quilisma` (boolean)
: Is this neume a quilisma?

`rest` (graphical (layout) object)
: A pointer to a `Rest` object.

`rest-collision` (graphical (layout) object)
: A rest collision that a rest is in.

`rests` (array of grobs)
: An array of rest objects.

`right-items` (array of grobs)
: DOCME

`right-neighbor` (graphical (layout) object)
: See `left-neighbor`.

`script-stencil` (pair)
: A pair `(`*`type . arg`*`)` which acts as an index for looking up a `Stencil` object.

`shorten` (dimension, in staff space)
: The amount of space that a stem is shortened. Internally used to distribute beam shortening over stems.

`side-support-elements` (array of grobs)
: The side support, an array of grobs.

`slur` (graphical (layout) object)
: A pointer to a `Slur` object.

`spacing` (graphical (layout) object)
: The spacing spanner governing this section.

`spacing-wishes` (array of grobs)
: An array of note spacing or staff spacing objects.

`staff-grouper` (graphical (layout) object)
: The staff grouper we belong to.

`staff-symbol` (graphical (layout) object)
: The staff symbol grob that we are in.

`stem` (graphical (layout) object)
: A pointer to a `Stem` object.

`stem-info` (pair)
: A cache of stem parameters.

`stems` (array of grobs)
: An array of stem objects.

`stropha` (boolean)
: Is this neume a stropha?

`system-Y-offset` (number)
: The Y-offset (relative to the bottom of the top-margin of the page) of the system to which this staff belongs.

`tie` (graphical (layout) object)
: A pointer to a `Tie` object.

`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.

`use-breve-rest` (boolean)
: Use breve rests for measures longer than a whole rest.

`virga` (boolean)
: Is this neume a virga?

`X-common` (graphical (layout) object)
: Common reference point for axis group.

`x-offset` (dimension, in staff space)
: Extra horizontal offset for ligature heads.

`Y-common` (graphical (layout) object)
: See `X-common`.

# 4 Scheme functions

`ly:add-context-mod` *contextmods modification* [Function]
Adds the given context *modification* to the list *contextmods* of context modifications.

`ly:add-file-name-alist` *alist* [Function]
Add mappings for error messages from *alist*.

`ly:add-interface` *iface desc props* [Function]
Add a new grob interface. *iface* is the interface name, *desc* is the interface description, and *props* is the list of user-settable properties for the interface.

`ly:add-listener` *list disp cl* [Function]
Add the listener *list* to the dispatcher *disp*. Whenever *disp* hears an event of class *cl*, it is forwarded to *list*.

`ly:add-option` *sym val description* [Function]
Add a program option *sym*. *val* is the default value and *description* is a string description.

`ly:all-grob-interfaces` [Function]
Return the hash table with all grob interface descriptions.

`ly:all-options` [Function]
Get all option settings in an alist.

`ly:all-stencil-expressions` [Function]
Return all symbols recognized as stencil expressions.

`ly:assoc-get` *key alist default-value strict-checking* [Function]
Return value if *key* in *alist*, else *default-value* (or `#f` if not specified). If *strict-checking* is set to `#t` and *key* is not in *alist*, a programming_error is output.

`ly:axis-group-interface::add-element` *grob grob-element* [Function]
Set *grob* the parent of *grob-element* on all axes of *grob*.

`ly: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*.

`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:box?` *x* [Function]
Is *x* a `Box` object?

`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*.

`ly:broadcast` *disp ev* [Function]
Send the stream event *ev* to the dispatcher *disp*.

`ly:camel-case->lisp-identifier` *name-sym* [Function]
Convert `FooBar_Bla` to `foo-bar-bla` style symbol.

`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.

`ly:cm` *num* [Function]
*num* cm.

`ly:command-line-code` [Function]
The Scheme code specified on command-line with '`-e`'.

`ly:command-line-options` [Function]
The Scheme options specified on command-line with '`-d`'.

`ly:command-line-verbose?` [Function]
Was `be_verbose_global` set?

`ly:connect-dispatchers` *to from* [Function]
Make the dispatcher *to* listen to events from *from*.

`ly:context?` *x* [Function]
Is *x* a `Context` object?

`ly:context-current-moment` *context* [Function]
Return the current moment of *context*.

`ly:context-event-source` *context* [Function]
Return `event-source` of context *context*.

`ly:context-events-below` *context* [Function]
Return a `stream-distributor` that distributes all events from *context* and all its subcontexts.

`ly:context-find` *context name* [Function]
Find a parent of *context* that has name or alias *name*. Return `#f` if not found.

`ly:context-grob-definition` *context name* [Function]
Return the definition of *name* (a symbol) within *context* as an alist.

`ly:context-id` *context* [Function]
Return the ID string of *context*, i.e., for `\context Voice = "one" ...` return the string `one`.

`ly:context-name` *context* [Function]
Return the name of *context*, i.e., for `\context Voice = "one" ...` return the symbol `Voice`.

`ly:context-now` *context* [Function]
Return `now-moment` of context *context*.

`ly:context-parent` *context* [Function]
Return the parent of *context*, `#f` if none.

`ly:context-property` *context sym def* [Function]
Return the value for property *sym* in *context*. If *def* is given, and property value is `'()`, return *def*.

`ly:context-property-where-defined` *context name* [Function]
Return the context above *context* where *name* is defined.

`ly:context-pushpop-property` *context grob eltprop val* [Function]
Do a single `\override` or `\revert` operation in *context*. The grob definition *grob* is extended with *eltprop* (if *val* is specified) or reverted (if unspecified).

`ly:context-set-property!` *context name val* [Function]
Set value of property *name* in context *context* to *val*.

`ly:context-unset-property` *context name* [Function]
Unset value of property *name* in context *context*.

`ly:default-scale` [Function]
Get the global default scale.

`ly:dimension?` *d* [Function]
Return *d* as a number. 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.

`ly:dispatcher?` *x* [Function]
Is *x* a `Dispatcher` object?

`ly:duration?` *x* [Function]
Is *x* a `Duration` object?

`ly:duration<?` *p1 p2* [Function]
Is *p1* shorter than *p2*?

`ly:duration->string` *dur* [Function]
Convert *dur* to a string.

`ly:duration-dot-count` *dur* [Function]
Extract the dot count from *dur*.

`ly:duration-factor` *dur* [Function]
Extract the compression factor from *dur*. Return it as a pair.

`ly:duration-length` *dur* [Function]
The length of the duration as a `moment`.

`ly:duration-log` *dur* [Function]
Extract the duration log from *dur*.

`ly:effective-prefix` [Function]
Return effective prefix.

`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:error` *str rest* [Function]
A Scheme callable function to issue the error *str*. The error is formatted with `format` and *rest*.

`ly:eval-simple-closure` *delayed closure scm-start scm-end* [Function]
Evaluate a simple *closure* with the given *delayed* argument. If *scm-start* and *scm-end* are defined, evaluate it purely with those start and end points.

`ly:event-deep-copy` *m* [Function]
Copy *m* and all sub expressions of *m*.

`ly:event-property` *sev sym* [Function]
Get the property *sym* of stream event *mus*. If *sym* is undefined, return `'()`.

`ly:event-set-property!` *ev sym val* [Function]
Set property *sym* in event *ev* to *val*.

`ly:expand-environment` *str* [Function]
Expand `$VAR` and `${VAR}` in *str*.

`ly:export` *arg* [Function]
Export a Scheme object to the parser so it is treated as an identifier.

`ly:find-file` *name* [Function]
Return the absolute file name of *name*, or `#f` if not found.

`ly:font-config-add-directory` *dir* [Function]
Add directory *dir* to FontConfig.

`ly:font-config-add-font` *font* [Function]
Add font *font* to FontConfig.

`ly:font-config-display-fonts` [Function]
Dump a list of all fonts visible to FontConfig.

`ly:font-config-get-font-file` *name* [Function]
Get the file for font *name*.

`ly:font-design-size` *font* [Function]
Given the font metric *font*, return the design size, relative to the current output-scale.

`ly:font-file-name` *font* [Function]
Given the font metric *font*, return the corresponding file name.

`ly:font-get-glyph` *font name* [Function]
Return a stencil from *font* for the glyph named *name*. If the glyph is not available, return an empty stencil.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:font-glyph-name-to-charcode` *font name* [Function]
Return the character code for glyph *name* in *font*.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:font-glyph-name-to-index` *font name* [Function]
Return the index for *name* in *font*.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:font-index-to-charcode` *font index* [Function]
Return the character code for *index* in *font*.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

`ly:font-magnification` *font* [Function]
Given the font metric *font*, return the magnification, relative to the current output-scale.

`ly:font-metric?` *x* [Function]
Is *x* a `Font_metric` object?

`ly:font-name` *font* [Function]
Given the font metric *font*, return the corresponding name.

`ly:font-sub-fonts` *font* [Function]
Given the font metric *font* of an OpenType font, return the names of the subfonts within *font*.

`ly:format` *str rest* [Function]
LilyPond specific format, 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.

`ly:get-all-function-documentation` [Function]
Get a hash table with all LilyPond Scheme extension functions.

`ly:get-all-translators` [Function]
Return a list of all translator objects that may be instantiated.

`ly:get-context-mods` *contextmod* [Function]
Returns the list of context modifications stored in *contextmod*.

`ly:get-listened-event-classes` [Function]
Return a list of all event classes that some translator listens to.

`ly:get-option` *var* [Function]
Get a global option setting.

`ly:gettext` *original* [Function]
A Scheme wrapper function for `gettext`.

`ly:grob?` *x* [Function]
Is *x* a `Grob` object?

`ly:grob-alist-chain` *grob global* [Function]
Get an alist chain for grob *grob*, with *global* as the global default. If unspecified, `font-defaults` from the layout block is taken.

`ly:grob-array?` *x* [Function]
Is *x* a `Grob_array` object?

`ly:grob-array-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-interfaces` *grob* [Function]
Return the interfaces list of grob *grob*.

`ly:grob-layout` *grob* [Function]
Get `\layout` definition from grob *grob*.

`ly:grob-object` *grob sym* [Function]
Return the value of a pointer in grob *grob* of property *sym*. It returns `'()` (end-of-list) if *sym* is undefined in *grob*.

`ly:grob-original` *grob* [Function]
Return the unbroken original grob of *grob*.

`ly:grob-parent` *grob axis* [Function]
Get the parent of *grob*. *axis* is 0 for the X-axis, 1 for the Y-axis.

`ly:grob-pq<?` *a b* [Function]
Compare two grob priority queue entries. This is an internal function.

`ly:grob-properties` *grob* [Function]
Get the mutable properties of *grob*.

`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-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* 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-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*.

`ly:grob-translate-axis!` *grob d a* [Function]
Translate *grob* on axis *a* over distance *d*.

`ly:gulp-file` *name size* [Function]
Read *size* characters from the file *name*, and return its contents in a string. If *size* is undefined, the entire file is read. The file is looked up using the search path.

`ly:hash-table-keys` *tab* [Function]
Return a list of keys in *tab*.

`ly:inch` *num* [Function]
*num* inches.

`ly:input-both-locations` *sip* [Function]
Return input location in *sip* as `(file-name first-line first-column last-line last-column)`.

`ly:input-file-line-char-column` *sip* [Function]
Return input location in *sip* as `(file-name line char column)`.

`ly:input-location?` *x* [Function]
Is *x* an `input-location`?

`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:interpret-music-expression` *mus ctx* [Function]
Interpret the music expression *mus* in the global context *ctx*. The context is returned in its final state.

`ly:interpret-stencil-expression` *expr func arg1 offset* [Function]
Parse *expr*, feed bits to *func* with first arg *arg1* having offset *offset*.

`ly:intlog2` *d* [Function]
The 2-logarithm of $1/d$.

`ly:is-listened-event-class` *sym* [Function]
Is *sym* a listened event class?

`ly:item?` *g* [Function]
Is *g* an `Item` object?

`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:iterator?` *x* [Function]
Is *x* a `Music_iterator` object?

`ly:lexer-keywords` *lexer* [Function]
Return a list of `(KEY . CODE)` pairs, signifying the LilyPond reserved words list.

`ly:lily-lexer?` *x* [Function]
Is *x* a `Lily_lexer` object?

`ly:lily-parser?` *x* [Function]
Is *x* a `Lily_parser` object?

`ly:listener?` *x* [Function]
Is *x* a `Listener` object?

`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`.

`ly:make-dispatcher` [Function]
Return a newly created dispatcher.

`ly:make-duration` *length dotcount num den* [Function]
*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 *num* and *den*.

A duration is a musical duration, i.e., a length of time described by a power of two (whole, half, quarter, etc.) and a number of augmentation dots.

`ly:make-global-context` *output-def* [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.

`ly:make-listener` *callback* [Function]
Create a listener. Any time the listener hears an object, it will call *callback* with that object.

*callback* should take exactly one argument.

`ly:make-moment` *n d gn gd* [Function]
Create the rational number with main timing $n/d$, and optional grace timing $gn/gd$.

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.

`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.

`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* is a list containing either `ly:music?` predicates or other type predicates.

`ly:make-output-def` [Function]
Make an output definition.

`ly:make-page-label-marker` *label* [Function]
Return page marker with label *label*.

`ly:make-page-permission-marker` *symbol permission* [Function]
Return page marker with page breaking and turning permissions.

`ly:make-pango-description-string` *chain size* [Function]
Make a `PangoFontDescription` string for the property alist *chain* at size *size*.

`ly:make-paper-outputter` *port format* [Function]
Create an outputter that evaluates within `output-`*format*, writing to *port*.

`ly:make-pitch` *octave note alter* [Function]
*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. *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-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-score` *music* [Function]
Return score with *music* encapsulated in it.

`ly:make-simple-closure` *expr* [Function]
Make a simple closure. *expr* should be form of `(func a1 a2 ...)`, and will be invoked as `(func delayed-arg a1 a2 ...)`.

`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 `(1000 . -1000)` as its value), it is taken to be empty.

`ly:make-stream-event` *cl proplist* [Function]
Create a stream event of class *cl* with the given mutable property list.

`ly:message` *str rest* [Function]
A Scheme callable function to issue the message *str*. The message is formatted with `format` and *rest*.

`ly:minimal-breaking` *pb* [Function]
Break (pages and lines) the `Paper_book` object *pb* without looking for optimal spacing: stack as many lines on a page before moving to the next one.

`ly:mm` *num* [Function]
*num* mm.

`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 occurence. If not found, return *def* or `#f` if *def* isn't specified.

`ly:moment?` *x* [Function]
Is *x* a `Moment` object?

`ly:moment<?` *a b* [Function]
Compare two moments.

`ly:moment-add` *a b* [Function]
Add two moments.

`ly:moment-div` *a b* [Function]
Divide two moments.

`ly:moment-grace-denominator` *mom* [Function]
Extract denominator from grace timing.

`ly:moment-grace-numerator` *mom* [Function]
Extract numerator from grace timing.

`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 two moments.

`ly:moment-sub` *a b* [Function]
Subtract two moments.

`ly:music?` *obj* [Function]
Is *obj* a music object?

`ly:music-compress` *m factor* [Function]
Compress music object *m* by moment *factor*.

`ly:music-deep-copy` *m* [Function]
Copy *m* and all sub expressions of *m*.

`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.

`ly:music-function?` *x* [Function]
Is *x* a `music-function`?

`ly:music-function-extract` *x* [Function]
Return the Scheme function inside *x*.

`ly:music-length` *mus* [Function]
Get the length of music expression *mus* and return it as a `Moment` object.

`ly:music-list?` *lst* [Function]
Is *lst* a list of music objects?

`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 `Music_output` object?

`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.

`ly:music-set-property!` *mus sym val* [Function]
Set property *sym* in music expression *mus* to *val*.

`ly:music-transpose` *m p* [Function]
Transpose *m* such that central C is mapped to *p*. Return *m*.

`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-head::stem-attachment` *font-metric glyph-name* [Function]
Get attachment in *font-metric* for attaching a stem to notehead *glyph-name*.

`ly:number->string` *s* [Function]
Convert *s* to a string without generating many decimals.

`ly:optimal-breaking` *pb* [Function]
Optimally break (pages and lines) the `Paper_book` object *pb* to minimize badness in bother vertical and horizontal spacing.

`ly:option-usage` [Function]
Print `ly:set-option` usage.

`ly:otf->cff` *otf-file-name* [Function]
Convert the contents of an OTF file to a CFF file, returning it as a string.

`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?` *def* [Function]
Is *def* an output definition?

`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` *def* [Function]
Return the parent output definition of *def*.

`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-formats` [Function]
Formats passed to '`--format`' as a list of strings, used for the output.

`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-module` *outputter* [Function]
Return output module of *outputter*.

`ly:outputter-output-scheme` *outputter expr* [Function]
Eval *expr* in module of *outputter*.

`ly:outputter-port` *outputter* [Function]
Return output port for *outputter*.

`ly:page-marker?` *x* [Function]
Is *x* a `Page_marker` object?

`ly:page-turn-breaking` *pb* [Function]
Optimally break (pages and lines) the `Paper_book` object *pb* such that page turns only happen in specified places, returning its pages.

`ly:pango-font?` *f* [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*.

`ly:paper-book?` *x* [Function]
Is *x* a `Paper_book` object?

`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-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`?

`ly:paper-system-minimum-distance` *sys1 sys2* [Function]
Measure the minimum distance between these two paper-systems, using their stored skylines if possible and falling back to their extents otherwise.

`ly:parse-file` *name* [Function]
Parse a single `.ly` file. Upon failure, throw `ly-file-failed` key.

`ly:parser-clear-error` *parser* [Function]
Clear the error flag for the parser.

`ly:parser-clone` *parser-smob* [Function]
Return a clone of *parser-smob*.

`ly:parser-define!` *parser-smob symbol val* [Function]
Bind *symbol* to *val* in *parser-smob*'s module.

`ly:parser-error` *parser msg input* [Function]
Display an error message and make the parser fail.

`ly:parser-has-error?` *parser* [Function]
Does *parser* have an error flag?

`ly:parser-include-string` *parser-smob ly-code* [Function]
Include the string *ly-code* into the input stream for *parser-smob*.

`ly:parser-lexer` *parser-smob* [Function]
Return the lexer for *parser-smob*.

`ly:parser-lookup` *parser-smob symbol* [Function]
Look up *symbol* in *parser-smob*'s module. Return `'()` if not defined.

`ly:parser-output-name` *parser* [Function]
Return the base name of the output file.

`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` *parser names* [Function]
Replace current note names in *parser*. *names* is an alist of symbols. This only has effect if the current mode is notes.

`ly:parser-set-repetition-function` *parser fun* [Function]
Replace the current repetition function in *parser*. *fun* is the new repetition function.

`ly:parser-set-repetition-symbol` *parser sym* [Function]
Replace the current repetition symbol in *parser*. *sym* is the new repetition symbol.

`ly:performance-write` *performance filename* [Function]
Write *performance* to *filename*.

`ly:pfb->pfa` *pfb-file-name* [Function]
Convert the contents of a Type 1 font in PFB format to PFA format.

`ly:pitch?` *x* [Function]
Is *x* a `Pitch` object?

`ly:pitch<?` *p1 p2* [Function]
Is *p1* lexicographically smaller than *p2*?

`ly:pitch-alteration` *pp* [Function]
Extract the alteration from pitch *pp*.

`ly:pitch-diff` *pitch root* [Function]
Return pitch *delta* such that *pitch* transposed by *delta* equals *root*.

`ly:pitch-negate` *p* [Function]
Negate *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 *pp* from middle C.

`ly:pitch-semitones` *pp* [Function]
Calculate the number of semitones of *pp* from middle C.

`ly:pitch-steps` *p* [Function]
Number of steps counted from middle C of the pitch *p*.

`ly:pitch-transpose` *p delta* [Function]
Transpose *p* by the amount *delta*, where *delta* is relative to middle C.

`ly:pointer-group-interface::add-grob` *grob sym grob-element* [Function]
Add *grob-element* to *grob*'s *sym* grob array.

`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).

`ly:prob?` *x* [Function]
Is *x* a `Prob` object?

`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 *sym* 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` and *rest*.

`ly:progress` *str rest* [Function]
A Scheme callable function to print progress *str*. The message is formatted with `format` and *rest*.

`ly:property-lookup-stats` *sym* [Function]
Return hash table with a property access corresponding to *sym*. Choices are `prob`, `grob`, and `context`.

`ly:protects` [Function]
Return hash of protected objects.

`ly:pt` *num* [Function]
*num* printer points.

`ly:register-stencil-expression` *symbol* [Function]
Add *symbol* as head of a stencil expression.

`ly:relative-group-extent` *elements common axis* [Function]
Determine the extent of *elements* relative to *common* in the *axis* direction.

`ly:reset-all-fonts` [Function]
Forget all about previously loaded fonts.

`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-filled-polygon` *points blot* [Function]
Make a `Stencil` object that prints a black polygon with corners at the points defined by *points* (list of coordinate pairs) and roundness *blot*.

`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.

Optionally, this routine takes an object-key to to uniquely identify the score block containing it.

`ly:score?` *x* [Function]
Is *x* a `Score` object?

`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.

`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.

`ly:set-grob-modification-callback` *cb* [Function]
Specify a procedure that will be called every time LilyPond modifies a grob property. The callback will receive as arguments the grob that is being modified, the name of the C++ file in which the modification was requested, the line number in the C++ file in which the modification was requested, the name of the function in which the modification was requested, the property to be changed, and the new value for the property.

`ly:set-middle-C!` *context* [Function]
Set the `middleCPosition` variable in *context* based on the variables `middleCClefPosition` and middleCOffset.

`ly:set-option` *var val* [Function]
Set a program option.

`ly:set-property-cache-callback` *cb* [Function]
Specify a procedure that will be called whenever lilypond calculates a callback function and caches the result. The callback will receive as arguments the grob whose property it is, the name of the property, the name of the callback that calculated the property, and the new (cached) value of the property.

`ly:simple-closure?` *clos* [Function]
Is *clos* a simple closure?

`ly:skyline?` *x* [Function]
Is *x* a `Skyline` object?

`ly:skyline-pair?` *x* [Function]
Is *x* a `Skyline_pair` object?

`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 `Source_file` object?

`ly:spanner?` *g* [Function]
Is *g* a spanner object?

`ly:spanner-bound` *spanner dir* [Function]
Get one of the bounds of *spanner*. *dir* is `-1` for left, and `1` for right.

`ly:spanner-broken-into` *spanner* [Function]
Return broken-into list for *spanner*.

`ly:spanner-set-bound!` *spanner dir item* [Function]
Set grob *item* as bound in direction *dir* for *spanner*.

`ly:staff-symbol-line-thickness` *grob* [Function]
Returns the `line-thickness` of the staff associated with *grob*.

`ly:staff-symbol-staff-space` *grob* [Function]
Returns the `staff-space` of the staff associated with *grob*.

`ly:start-environment` [Function]
Return the environment (a list of strings) that was in effect at program start.

`ly:stderr-redirect` *file-name mode* [Function]
Redirect stderr to *file-name*, opened with *mode*.

`ly:stencil?` *x* [Function]
Is *x* a `Stencil` object?

`ly:stencil-add` *args* [Function]
Combine stencils. Takes any number of arguments.

`ly:stencil-aligned-to` *stil axis dir* [Function]
Align *stil* using its own extents. *dir* is a number. `-1` and `1` are left and right, respectively. Other values are interpolated (so `0` means the center).

`ly:stencil-combine-at-edge` *first axis direction second padding minimum* [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. If this puts the reference points closer than *minimum*, they are moved by the latter amount. *first* and *second* may also be `'()` or `#f`.

`ly:stencil-empty?` *stil* [Function]
Return whether *stil* is empty.

`ly:stencil-expr` *stil* [Function]
Return the expression of *stil*.

`ly:stencil-extent` *stil axis* [Function]
Return a pair of numbers signifying the extent of *stil* in *axis* direction (`0` or `1` for x and y axis, respectively).

`ly:stencil-fonts` *s* [Function]
Analyze *s*, and return a list of fonts used in *s*.

`ly:stencil-in-color` *stc r g b* [Function]
Put *stc* in a different color.

`ly:stencil-rotate` *stil angle x y* [Function]
Return a stencil *stil* rotated *angle* degrees around the relative offset (*x*, *y*). E.g. an offset of (-1, 1) will rotate the stencil around the left upper corner.

`ly:stencil-rotate-absolute` *stil angle x y* [Function]
Return a stencil *stil* rotated *angle* degrees around point (*x*, *y*), given in absolute coordinates.

`ly:stencil-scale` *stil x y* [Function]
Scale *stil* using the horizontal and vertical scaling factors *x* and *y*.

`ly:stencil-translate` *stil offset* [Function]
Return a *stil*, but translated by *offset* (a pair of numbers).

`ly:stencil-translate-axis` *stil amount axis* [Function]
Return a copy of *stil* but translated by *amount* in *axis* direction.

`ly:stream-event?` *obj* [Function]
Is *obj* a `Stream_event` object?

`ly:string-percent-encode` *str* [Function]
Encode all characters in string *str* with hexadecimal percent escape sequences, with the following exceptions: characters `-`, `.`, `/`, and `_`; 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*.

`ly:success` *str rest* [Function]
A Scheme callable function to issue a success message *str*. The message is formatted with `format` and *rest*.

`ly:system-font-load` *name* [Function]
Load the OpenType system font '*name*`.otf`'. Fonts loaded with this command must contain three additional SFNT font tables called `LILC`, `LILF`, and `LILY`, needed for typesetting musical elements. Currently, only the Emmentaler and the Emmentaler-Brace fonts fulfill these requirements.

Note that only `ly:font-get-glyph` and derived code (like `\lookup`) can access glyphs from the system fonts; text strings are handled exclusively via the Pango interface.

`ly:text-interface::interpret-markup` [Function]
Convert a text markup into a stencil. Takes three arguments, *layout*, *props*, and *markup*.

*layout* is a `\layout` block; it may be obtained from a grob with `ly:grob-layout`. *props* is an alist chain, i.e. a list of alists. This is typically obtained with `(ly:grob-alist-chain grob (ly:output-def-lookup layout 'text-font-defaults))`. *markup* is the markup text to be processed.

`ly:translator?` *x* [Function]
Is *x* a `Translator` object?

`ly:translator-context` *trans* [Function]
Return the context of the translator object *trans*.

`ly:translator-description` *me* [Function]
Return an alist of properties of translator *me*.

`ly:translator-group?` *x* [Function]
Is *x* a `Translator_group` object?

`ly:translator-name` *trans* [Function]
Return the type name of the translator object *trans*. The name is a symbol.

`ly:transpose-key-alist` *l pit* [Function]
Make a new key alist of *l* transposed by pitch *pit*.

`ly:truncate-list!` *lst i* [Function]
Take at most the first *i* of list *lst*.

`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:unit` [Function]
Return the unit used for lengths as a string.

`ly:usage` [Function]
Print usage message.

`ly:version` [Function]
Return the current lilypond version as a list, e.g., `(1 3 127 uu1)`.

`ly:warning` *str rest* [Function]
A Scheme callable function to issue the warning *str*. The message is formatted with `format` and *rest*.

`ly:wide-char->utf-8` *wc* [Function]
Encode the Unicode codepoint *wc*, an integer, as UTF-8.

# Appendix A Indices

## A.1 Concept index

(Index is nonexistent)

## A.2 Function index


ly:add-context-mod ... 465
ly:add-file-name-alist ... 465
ly:add-interface ... 465
ly:add-listener ... 465
ly:add-option ... 465
ly:all-grob-interfaces ... 465
ly:all-options ... 465
ly:all-stencil-expressions ... 465
ly:assoc-get ... 465
ly:axis-group-interface::add-element ... 465
ly:book-add-bookpart! ... 465
ly:book-add-score! ... 465
ly:book-book-parts ... 465
ly:book-paper ... 465
ly:book-process ... 465
ly:book-process-to-systems ... 465
ly:book-scores ... 466
ly:box? ... 466
ly:bp ... 466
ly:bracket ... 466
ly:broadcast ... 466
ly:camel-case->lisp-identifier ... 466
ly:chain-assoc-get ... 466
ly:cm ... 466
ly:command-line-code ... 466
ly:command-line-options ... 466
ly:command-line-verbose? ... 466
ly:connect-dispatchers ... 466
ly:context-current-moment ... 466
ly:context-event-source ... 466
ly:context-events-below ... 466
ly:context-find ... 466
ly:context-grob-definition ... 466
ly:context-id ... 467
ly:context-name ... 467
ly:context-now ... 467
ly:context-parent ... 467
ly:context-property ... 467
ly:context-property-where-defined ... 467
ly:context-pushpop-property ... 467
ly:context-set-property! ... 467
ly:context-unset-property ... 467
ly:context? ... 466
ly:default-scale ... 467
ly:dimension? ... 467
ly:dir? ... 467
ly:dispatcher? ... 467
ly:duration->string ... 467
ly:duration-dot-count ... 467
ly:duration-factor ... 467
ly:duration-length ... 468
ly:duration-log ... 468
ly:duration<? ... 467
ly:duration? ... 467
ly:effective-prefix ... 468
ly:engraver-announce-end-grob ... 468
ly:engraver-make-grob ... 468
ly:error ... 468
ly:eval-simple-closure ... 468
ly:event-deep-copy ... 468
ly:event-property ... 468
ly:event-set-property! ... 468
ly:expand-environment ... 468
ly:export ... 468
ly:find-file ... 468
ly:font-config-add-directory ... 468
ly:font-config-add-font ... 468
ly:font-config-display-fonts ... 468
ly:font-config-get-font-file ... 468
ly:font-design-size ... 468
ly:font-file-name ... 469
ly:font-get-glyph ... 469
ly:font-glyph-name-to-charcode ... 469
ly:font-glyph-name-to-index ... 469
ly:font-index-to-charcode ... 469
ly:font-magnification ... 469
ly:font-metric? ... 469
ly:font-name ... 469
ly:font-sub-fonts ... 469
ly:format ... 469
ly:format-output ... 469
ly:get-all-function-documentation ... 469
ly:get-all-translators ... 469
ly:get-context-mods ... 469
ly:get-listened-event-classes ... 470
ly:get-option ... 470
ly:gettext ... 470
ly:grob-alist-chain ... 470
ly:grob-array-length ... 470
ly:grob-array-ref ... 470
ly:grob-array? ... 470
ly:grob-basic-properties ... 470
ly:grob-chain-callback ... 470
ly:grob-common-refpoint ... 470
ly:grob-common-refpoint-of-array ... 470
ly:grob-default-font ... 470
ly:grob-extent ... 470
ly:grob-interfaces ... 470
ly:grob-layout ... 470
ly:grob-object ... 470
ly:grob-original ... 470
ly:grob-parent ... 471
ly:grob-pq<? ... 471
ly:grob-properties ... 471

ly:grob-property ... 471
ly:grob-property-data ... 471
ly:grob-relative-coordinate ... 471
ly:grob-robust-relative-extent ... 471
ly:grob-script-priority-less ... 471
ly:grob-set-nested-property! ... 471
ly:grob-set-object! ... 471
ly:grob-set-parent! ... 471
ly:grob-set-property! ... 471
ly:grob-staff-position ... 471
ly:grob-suicide! ... 471
ly:grob-system ... 471
ly:grob-translate-axis! ... 471
ly:grob? ... 470
ly:gulp-file ... 471
ly:hash-table-keys ... 471
ly:inch ... 471
ly:input-both-locations ... 472
ly:input-file-line-char-column ... 472
ly:input-location? ... 472
ly:input-message ... 472
ly:interpret-music-expression ... 472
ly:interpret-stencil-expression ... 472
ly:intlog2 ... 472
ly:is-listened-event-class ... 472
ly:item-break-dir ... 472
ly:item? ... 472
ly:iterator? ... 472
ly:lexer-keywords ... 472
ly:lily-lexer? ... 472
ly:lily-parser? ... 472
ly:listener? ... 472
ly:make-book ... 472
ly:make-book-part ... 472
ly:make-dispatcher ... 472
ly:make-duration ... 473
ly:make-global-context ... 473
ly:make-global-translator ... 473
ly:make-listener ... 473
ly:make-moment ... 473
ly:make-music ... 473
ly:make-music-function ... 473
ly:make-output-def ... 473
ly:make-page-label-marker ... 473
ly:make-page-permission-marker ... 473
ly:make-pango-description-string ... 473
ly:make-paper-outputter ... 473
ly:make-pitch ... 473
ly:make-prob ... 474
ly:make-scale ... 474
ly:make-score ... 474
ly:make-simple-closure ... 474
ly:make-stencil ... 474
ly:make-stream-event ... 474
ly:message ... 474
ly:minimal-breaking ... 474
ly:mm ... 474
ly:module->alist ... 474
ly:module-copy ... 474
ly:modules-lookup ... 474
ly:moment-add ... 474
ly:moment-div ... 474
ly:moment-grace-denominator ... 475
ly:moment-grace-numerator ... 475
ly:moment-main-denominator ... 475
ly:moment-main-numerator ... 475
ly:moment-mod ... 475
ly:moment-mul ... 475
ly:moment-sub ... 475
ly:moment<? ... 474
ly:moment? ... 474
ly:music-compress ... 475
ly:music-deep-copy ... 475
ly:music-duration-compress ... 475
ly:music-duration-length ... 475
ly:music-function-extract ... 475
ly:music-function? ... 475
ly:music-length ... 475
ly:music-list? ... 475
ly:music-mutable-properties ... 475
ly:music-output? ... 475
ly:music-property ... 475
ly:music-set-property! ... 476
ly:music-transpose ... 476
ly:music? ... 475
ly:note-column-accidentals ... 476
ly:note-column-dot-column ... 476
ly:note-head::stem-attachment ... 476
ly:number->string ... 476
ly:optimal-breaking ... 476
ly:option-usage ... 476
ly:otf->cff ... 476
ly:otf-font-glyph-info ... 476
ly:otf-font-table-data ... 476
ly:otf-font? ... 476
ly:otf-glyph-count ... 476
ly:otf-glyph-list ... 476
ly:output-def-clone ... 476
ly:output-def-lookup ... 476
ly:output-def-parent ... 476
ly:output-def-scope ... 477
ly:output-def-set-variable! ... 477
ly:output-def? ... 476
ly:output-description ... 477
ly:output-formats ... 477
ly:outputter-close ... 477
ly:outputter-dump-stencil ... 477
ly:outputter-dump-string ... 477
ly:outputter-module ... 477
ly:outputter-output-scheme ... 477
ly:outputter-port ... 477
ly:page-marker? ... 477
ly:page-turn-breaking ... 477
ly:pango-font-physical-fonts ... 477
ly:pango-font? ... 477
ly:paper-book-pages ... 477
ly:paper-book-paper ... 477
ly:paper-book-performances ... 477
ly:paper-book-scopes ... 477
ly:paper-book-systems ... 478
ly:paper-book? ... 477
ly:paper-fonts ... 478
ly:paper-get-font ... 478
ly:paper-get-number ... 478
ly:paper-outputscale ... 478
ly:paper-score-paper-systems ... 478
ly:paper-system-minimum-distance ... 478
ly:paper-system? ... 478
ly:parse-file ... 478
ly:parser-clear-error ... 478

ly:parser-clone ... 478
ly:parser-define! ... 478
ly:parser-error ... 478
ly:parser-has-error? ... 478
ly:parser-include-string ... 478
ly:parser-lexer ... 478
ly:parser-lookup ... 478
ly:parser-output-name ... 478
ly:parser-parse-string ... 478
ly:parser-set-note-names ... 479
ly:parser-set-repetition-function ... 479
ly:parser-set-repetition-symbol ... 479
ly:performance-write ... 479
ly:pfb->pfa ... 479
ly:pitch-alteration ... 479
ly:pitch-diff ... 479
ly:pitch-negate ... 479
ly:pitch-notename ... 479
ly:pitch-octave ... 479
ly:pitch-quartertones ... 479
ly:pitch-semitones ... 479
ly:pitch-steps ... 479
ly:pitch-transpose ... 479
ly:pitch<? ... 479
ly:pitch? ... 479
ly:pointer-group-interface::add-grob ... 479
ly:position-on-line? ... 479
ly:prob-immutable-properties ... 480
ly:prob-mutable-properties ... 480
ly:prob-property ... 480
ly:prob-property? ... 480
ly:prob-set-property! ... 480
ly:prob-type? ... 480
ly:prob? ... 479
ly:programming-error ... 480
ly:progress ... 480
ly:property-lookup-stats ... 480
ly:protects ... 480
ly:pt ... 480
ly:register-stencil-expression ... 480
ly:relative-group-extent ... 480
ly:reset-all-fonts ... 480
ly:round-filled-box ... 480
ly:round-filled-polygon ... 480
ly:run-translator ... 480
ly:score-add-output-def! ... 481
ly:score-embedded-format ... 481
ly:score-error? ... 481
ly:score-header ... 481
ly:score-music ... 481
ly:score-output-defs ... 481
ly:score-set-header! ... 481
ly:score? ... 481
ly:set-default-scale ... 481
ly:set-grob-modification-callback ... 481
ly:set-middle-C! ... 481
ly:set-option ... 481
ly:set-property-cache-callback ... 481
ly:simple-closure? ... 481
ly:skyline-pair? ... 482
ly:skyline? ... 481
ly:smob-protects ... 482
ly:solve-spring-rod-problem ... 482
ly:source-file? ... 482
ly:spanner-bound ... 482
ly:spanner-broken-into ... 482
ly:spanner-set-bound! ... 482
ly:spanner? ... 482
ly:staff-symbol-line-thickness ... 482
ly:staff-symbol-staff-space ... 482
ly:start-environment ... 482
ly:stderr-redirect ... 482
ly:stencil-add ... 482
ly:stencil-aligned-to ... 482
ly:stencil-combine-at-edge ... 482
ly:stencil-empty? ... 483
ly:stencil-expr ... 483
ly:stencil-extent ... 483
ly:stencil-fonts ... 483
ly:stencil-in-color ... 483
ly:stencil-rotate ... 483
ly:stencil-rotate-absolute ... 483
ly:stencil-scale ... 483
ly:stencil-translate ... 483
ly:stencil-translate-axis ... 483
ly:stencil? ... 482
ly:stream-event? ... 483
ly:string-percent-encode ... 483
ly:string-substitute ... 483
ly:success ... 483
ly:system-font-load ... 483
ly:text-interface::interpret-markup ... 484
ly:translator-context ... 484
ly:translator-description ... 484
ly:translator-group? ... 484
ly:translator-name ... 484
ly:translator? ... 484
ly:transpose-key-alist ... 484
ly:truncate-list! ... 484
ly:ttf->pfa ... 484
ly:ttf-ps-name ... 484
ly:unit ... 484
ly:usage ... 484
ly:version ... 484
ly:warning ... 484
ly:wide-char->utf-8 ... 484