State of square notation in LilyPond

This document describes the state of square notation support as of LilyPond 2.24. It serves a double purpose: first to assist anyone considering LilyPond for an engraving project which involves square notation; second to set direction and priorities of possible future work on improving the square notation support. The source code may be useful as a source of code snippets and collection of workarounds for known issues.

For comprehensive documentation see the Ancient Notation section of the LilyPond Notation Reference.

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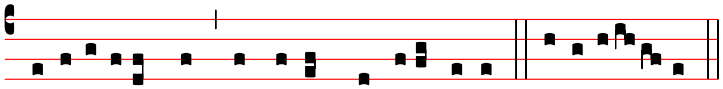
Safe area

LilyPond more or less safely renders square notation pieces which

- have lyrics
- contain no accidentals, articulations, rhythmic signs or puncta inclinata
- have no melismata longer than two or three notes

Examples of such chants are some very simple antiphons and hymns, as well as selected genres, e.g. prefaces.

AR1912, p. 2



Jubiláte Deo omnis terra, al lelúia. E u o u a e.

Scores not matching these requirements may still be rendered correctly, but each of the listed properties increases chances of running into some sort of glitch.

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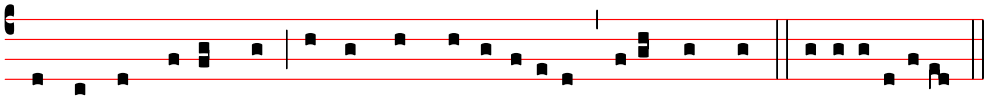
Potential selling points (compared to Gregorio)

LilyPond square notation is (by far) no match for Gregorio in terms of output quality and has some serious problems (see the chapters further below), but it also offers some unique features.

Unlimited lines of lyrics aligned to a staff (cf. gregorio#374) -- think of hymn stanzas, parallel lines of a sequence, litany invocations, psalm verses, ... or antiphon texts sung to the same melodic formula:

AR1912, p. 724; [32]



Martý-res Dó mini, Dóminum benedícite in aetérnum. E u o u a e.

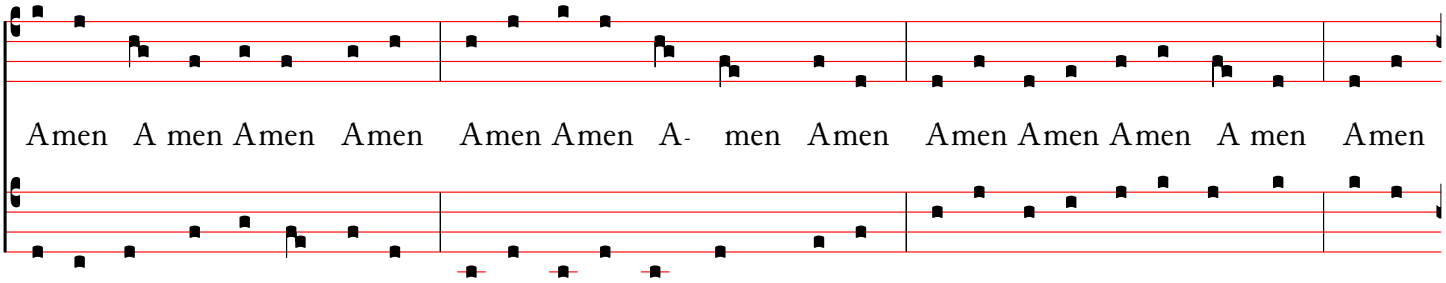
An ge- li Dó mini, ...

Sancti Dó mini, ...

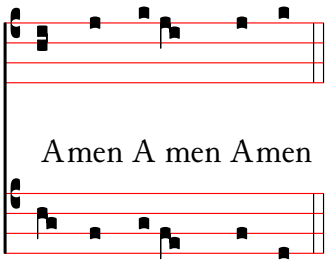
Vír gi nes Dó mini, ...

Multiple aligned staffs:

CZ-Pu XIV G 46, f. 102r

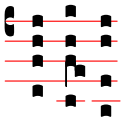


Amen A men Amen Amen Amen Amen A- men Amen Amen Amen Amen A men Amen

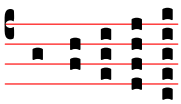


Amen A men Amen

Virtually unlimited in-staff polyphony

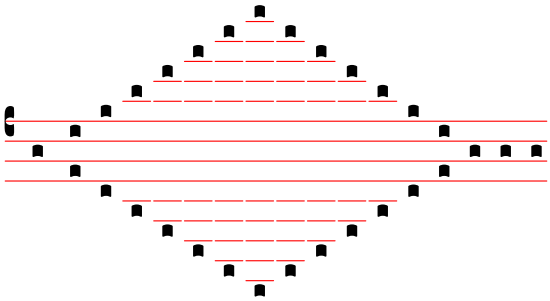


La la la



La la la la la

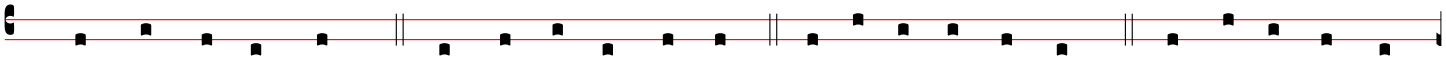
Virtually unlimited range and ledger lines (in Gregorio the maximum range without changing clef is 13 steps in the standard four line staff, 15 steps in a five line one; LilyPond doesn't limit the number of ledger lines)



La la la la la la la la la la la la la la la

Virtually unlimited staff lines (cf. gregorio#1623)

Chant notation on two lines is commonly used for Missal chants in German-speaking countries:

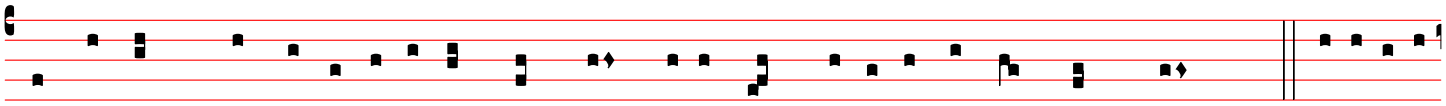


℣. Der Herr sei mit euch. ℟. Und mit deinem Gei ste. ℣. Er- he bet die Her zen. ℟. Wir ha ben sie beim

Herrn.

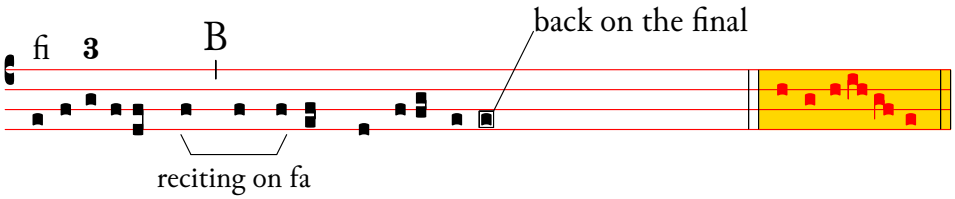
Chant notation on five lines is quite common in late manuscripts from Bohemia (and probably elsewhere).

CZ-HKm Hr-42 (II A 44), f. 483v

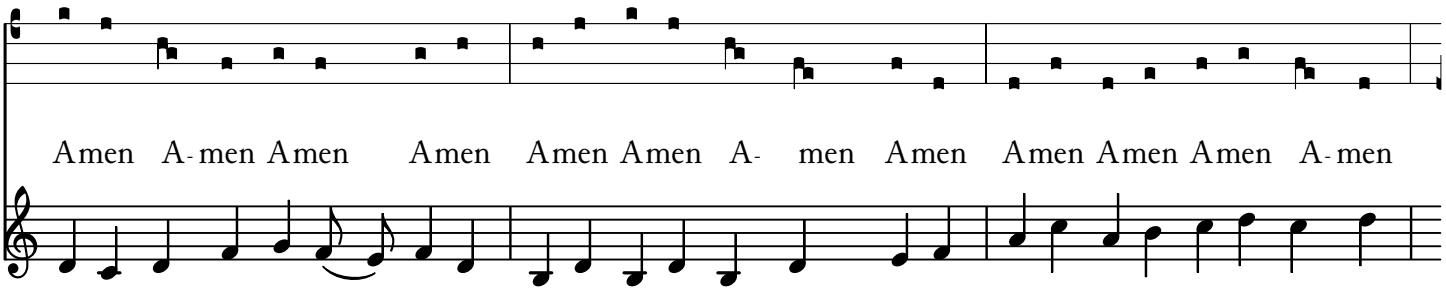


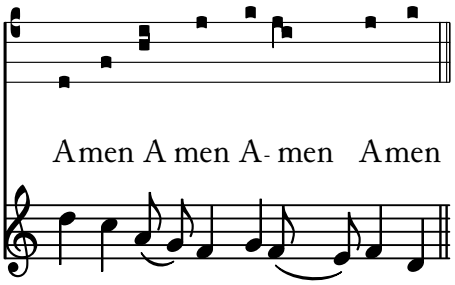
Wiernať gſau wſſec ka přj ka za- nj ge- ho, vtwr- ze- na až na wie- ky wie- kůw.

Various kinds of annotations:

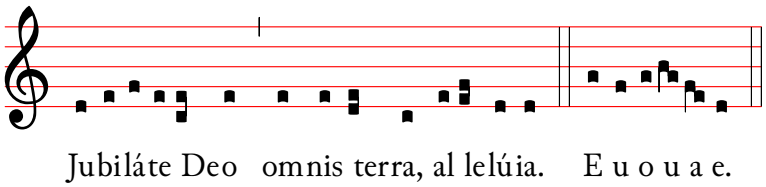


Different notation styles in a single system:

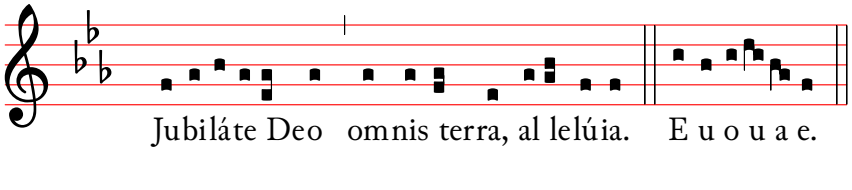




Square notation in modern staff:



Also with transposition to a different key:

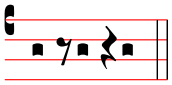


There are also many less prominent features which may be useful for specific use cases:

Parentheses (cf. gregorio#1545)

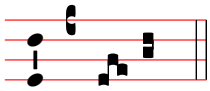
La La La

Rests (cf. gregorio#1624)



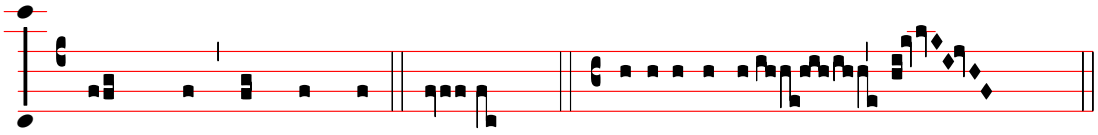
La La La

Ambitus (cf. gregorio#1453)



La La

cf. AR1912, p. 365



Christus factus est... cru cis... exaltávit il lum...

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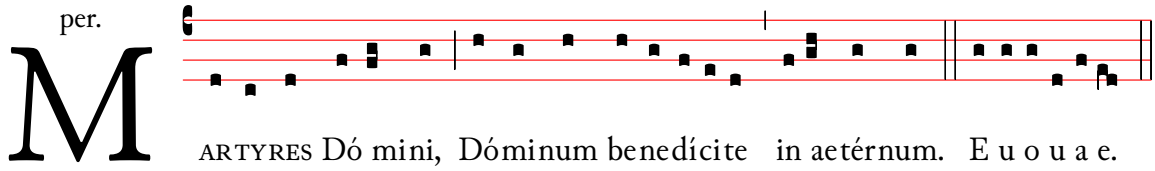
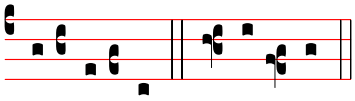
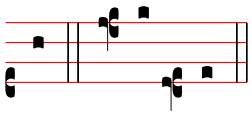
Missing notation features

Initials. They can be faked using LilyPond's instrument name facility, but correct positioning requires manual adjustment of each instance:



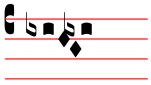
Missing clefs. The set of chant clefs predefined in LilyPond doesn't include the C clef on the bottom-most staff line and the F clef on the bottom- and upper-most line (example on the left). But it's true that modern chant editions rarely use these and custom clefs can be defined easily (example on the right), making this just a slight inconvenience.





Explicit positioning of b flat. It is standard practice in square notation to place the accidental earlier than the first affected note appears, in order to optimize appearance and readability. In Gregorio each accidental must be explicitly specified and is rendered wherever the input file specifies it. LilyPond on the other hand generates accidentals automatically, based on current key signature and note pitch, and doesn't support manual placement of a b flat independent of its note. And it doesn't take care to prevent collisions of accidentals with notes and other notation elements: the accidental is always placed immediately before the note it belongs to, no matter what (the first example). Workarounds are available (see the source code of the other examples).

Remembering b flat. In chant notation "B-flat, when it occurs, only holds good as far as the next natural (♮), or dividing line, or new word" (The Liber Usualis, Tournai-New York 1961, p. XIV). LilyPond by default repeats the accidental for every affected note, even within the same syllable.



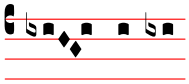
La

The behaviour is configurable, but none of the available settings works really well for square notation.

`\accidentalStyle default` (which would be quite useful if it worked the same way as in modern notation) works in a funny way and is of no use.

Laaaaa laaaa

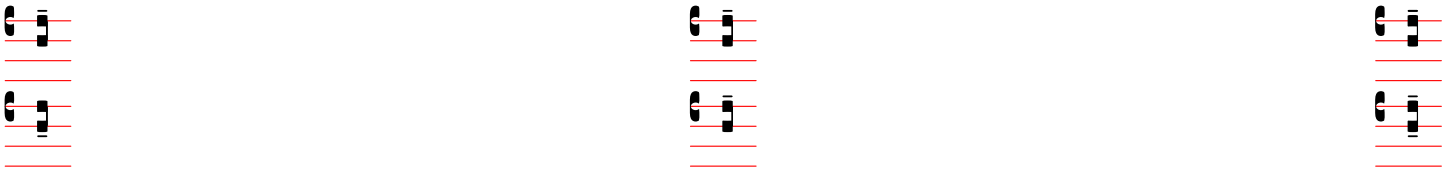
The only viable setting is `\accidentalStyle no-reset` which means that after the first b flat the accidental is remembered forever and in order to have rendered another one it must be explicitly requested with the exclamation mark suffix: `bes!`



Laa La La

Neumatic space. In modern chant editions spaces of various sizes structure longer neumes. LilyPond doesn't provide a standardized solution. Invisible notes of various sizes can be used as a workaround.

Context-sensitive episema direction. Episema direction is by default always set to UP. As a result, for pes (and other vertically stacked neumes) it's impossible to tell if the episema is attached to the bottom note (first example), top note (second example) or both (third example). But at least the correct result can be achieved by setting DOWN direction manually where appropriate (the second line of examples).



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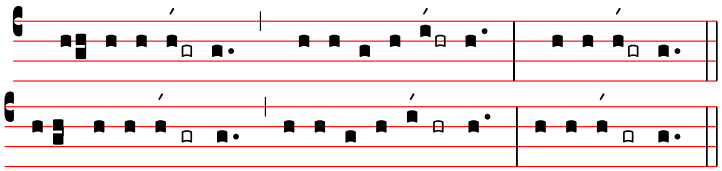
Severe horizontal spacing issues

The default spacing of scores without lyrics is extremely tight, to the point of being hardly readable (example left). It can be partially improved by adjusting the configuration (example right). A more reliable solution involves invisible lyrics (second example right).



Under a pes (and possibly some other vertically stacked neumes) the left edge of the lyric syllable is aligned to the right edge of the neume, so that the syllable is more after than under its neume. This lyrics alignment is very different from simple notes or other composed neume types.

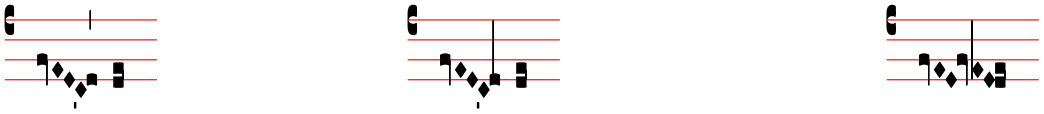
terra cer

Melismata (note groups enclosed in the `\[ \]` melisma brackets) collide/confound with their neighbours when the width of the melisma is greater than that of the lyric syllable underneath.

rí a. rí a. rí a.

dul

Melismata run under/over divisiones



O o O o O o

Markup attached to a note affects score horizontal spacing. In documents which include `gregorian.ly` this affects also modern notation scores.

La La La La

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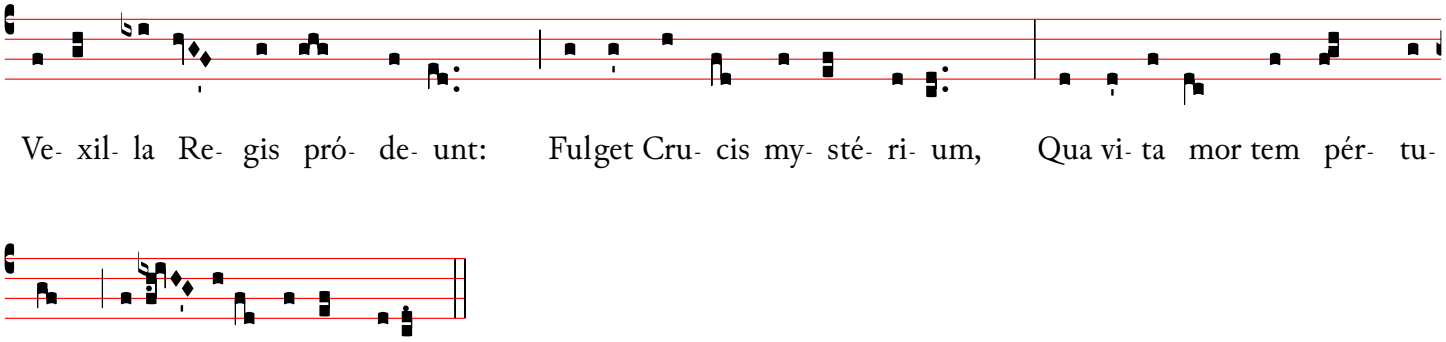
Other glitches

Rhythmic signs wandering around. In some scenarios punctum mora and ictus are not rendered with the notes where the source code indicates them, but at random places later in the score. In the following example each section closes with a clivis or pes, both notes of the neume always marked with a punctum mora. In the first two sections the puncta are rendered correctly, but in the third and fourth one they end up all over the place.

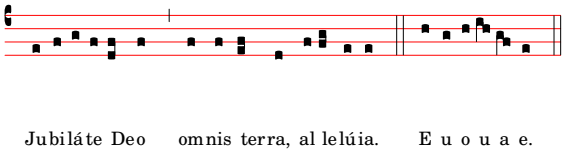
The Liber Usualis 1961, p. 575



State of square notation in LilyPond

Default settings

The default staff size is too small and lyrics even more so.



That's because LilyPond uses the so called staff space - the distance between two adjacent staff lines - as a base measuring unit. The default staff space is chosen so as to make sense in a five line staff of the modern notation and is applied to all supported notation styles, including square notation. But the characteristic proportions of square notation (ratio of the staff size to base note size and staff size to lyrics font size) are different from the modern notation. Due to the base note shape and its position in the staff the square notation requires a greater staff space than the modern notation in order to produce notes of comparable size/prominence. Square notation, in order to look at least remotely good and be comfortably readable, requires a greater staff size than the default one.
`ly/engraver-init.ly` sets for `VaticanaLyrics` the value of `LyricText.font-size` to `-4`. That's a sensitive relative font size (the absolute font size depends on staff size) and the lyrics look good once the staff size is increased. But at the same time is increased also the default text font size (standalone markup text, lyrics of modern notation scores). When square notation lyrics are readable, all the other text in the document is huge. Depending on what kinds of content the document contains and in which quantities, it is to be decided if the global settigns will be optimized for modern notation (and standalone markup text) and each instance of square notation will be resized manually, or vice versa.

Clef change, when meeting a divisio, is by default rendered before the divisio, no matter their order in the source code. This is usual in modern notation, but not in square notation. There is an easy fix (example on the right).