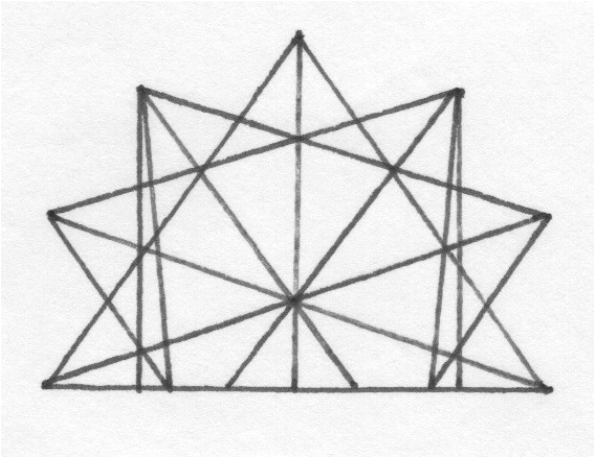
The MNMA Notation Evaluation



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COMMENTARY ON THE THIRTY-SEVEN NOTATION PROPOSALS

Siemen Terpstra

I will refer to the proposals by their LP number, #7 or #19.

The comments here concern the group as a whole. Reactions to individual notations are also found on the appropriate 'melody sample' pages.

ASSUMPTIONS

1. These notations are intended for *12-equal-temperament* tuning. Microtonal tuning systems necessitate complications not considered in this collection of proposals.

2. These notations are mainly for *keyboard* players. It appears that the principal aim of these reforms is to eliminate the notation of enharmonic differences (sharps and flats). Hence they constitute a move toward a 'tablature' approach suitable for keyboards. String and wind players are less enthusiastic about the elimination of this information, since their instruments *are* capable of such fine distinctions. For example, many wind and string players would intone the harmony A-Db-E differently from the harmony A-C#-E. Such enharmonic distinctions are meaningless on keyboards. Notations that eliminate enharmonic differences are thus peculiarly suited to keyboards. Inevitably they also prove relevant to guitars and harps—instruments we call 'fixed pitch.' But voices, winds, and strings have always chosen to 'add some color' to their harmonies, simply because their instruments are capable of it and because the human 'ear' delights in the play of subtlety.

3. The vast majority of these notations are *proportional* layouts of the pitch information. Only #36 and #37 are openly irregular (as is also the standard notation). Proportionality *does* have distinct advantages since a given interval-size is consistent in its visual appearance. Such notations are thus 'planimetric.' We will assume that proportionality is desirable.

4. The given 'G minor scale melody' covers three octaves and has some chords as well. Hence it 'demands' a *continuous* (octave cyclical) *staff notation*. Discontinuous staff notation is traditionally used for strings and winds (and guitars), but we will focus on keyboards. Consequently, I have restricted myself to the use of continuous staff notations and ignored the discontinuous staves as largely irrelevant.

5. I have assumed that it is undesirable to introduce *new shapes*, colors, etc. for the note-heads unless it is absolutely necessary. Such new shapes tend to slow down the writing and the reading of the music. Notations that require new note-head shapes are thus disadvantaged.

6. The *spacing* between staff lines is controversial, but I will assume that it is 2 mm. unless specified otherwise. Some notations require a different spacing, but the particular spacing should be clearly justified. Most of the notations herein use multiples of 2mm. in

their layouts. #10 is an interesting exception, using 3mm. line spacing. #36 and #37 are more 'eccentric.'

7. I am assuming that the reformer has kept the traditional means of notating *time values* (whole notes, half notes, rests, flags, etc.). The melodies are written using such traditional means whenever it is expedient. If the reformer demands a radically different system for notating time values then it should be clearly justified.

8. I assume that the *'reference' tone* is C in our examples. Arguments can also be made that it should be D, since 12-et (like 19-et and 31-et) is structurally symmetrical about the pitch D (and its tritone G#). The visual symmetry can be seen on the standard 7-5 keyboard itself and the traditional notation, that 'projects' this bi-polar symmetry as the flats and sharps along the line of musical fifths. Less convincing arguments can also be made for A (on historical grounds) or for F and/or G (on esoteric grounds). However, we will use C (and its attendant tritone F#) as reference by convention.

9. Some staff notations are peculiarly oriented toward *'6-6' keyboards* rather than the standard '7-5.' I will assume that they have a disadvantage since most keyboards are in fact 7-5. Moreover, the whole-tone scalar structure is artificial and not particularly musically significant. The *diminished harmony* is a much more structurally (and musically) significant factor as a 'signature' of the 12-et tuning system. The 12-et system is (uniquely) multi-symmetrical by division factors 2, 3, 4, and 6. Of these, 2 and 4 (and less arguably 3) are the most valuable in the notation. However, the 6-6 keyboards emphasize 2 and 6 (too much, I'm afraid!).

CRITERIA OF WORTH

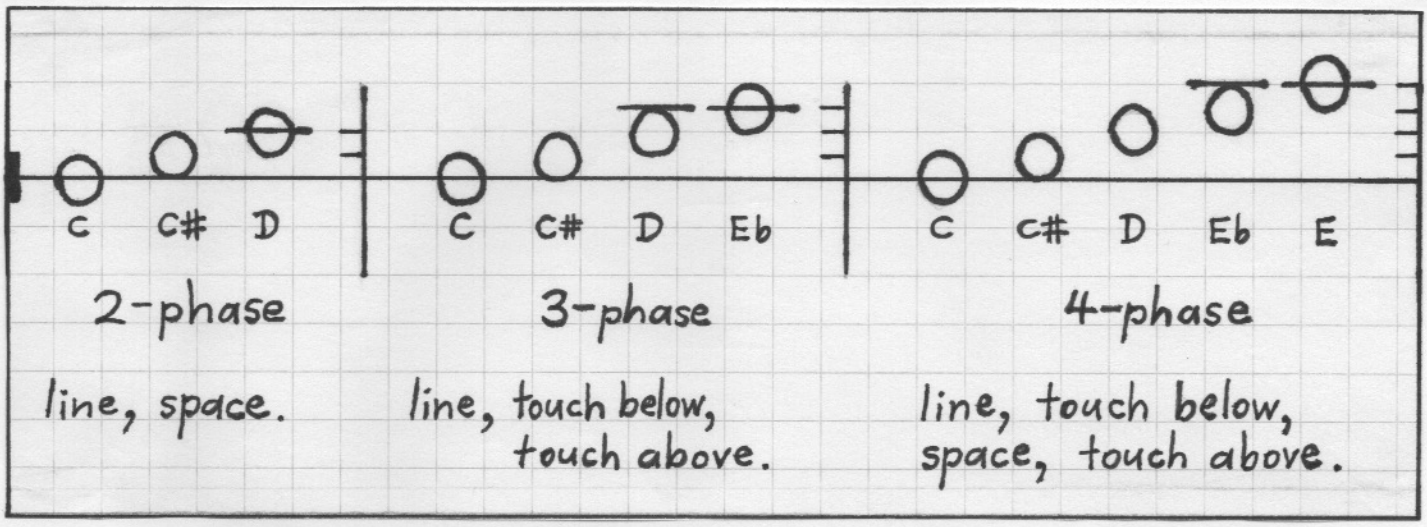
Simplicity relative to the standard notation.
Easier to read and write than the standard notation.
Suitable for harmony as well as melody in the entire gamut.
Proportional or near proportional.
(Optional) adaptibility to microtonal systems.

GENERAL IMPRESSIONS

I have to admit that I was a little disappointed by this survey of staff notations. Some patterns were over-represented (for example #16 to #22 and #24) while a number of perfectly reasonable approaches were quite under-represented. At their best they were 'not quite there' for me. So many 'variants' were also omitted that I decided to include a number of them for 'instructive' purposes in my commentaries. By doing this, I aim to impose a more systematic approach to the search for an 'optimum' pattern. I have chosen my particular 'six best' systems with this overview in mind, since each one has something positive to teach us about an optimal pattern(s). My 'system' involves the classification of the proposals into three 'groups' sharing the same underlying structural rubric. Bear with me in presenting this explanation and the rationale for my choice of 'six best' will become more apparent.

CLASSIFICATION OF THE PROPORTIONAL NOTATIONS

The meaning of my classification is well illustrated by a diagram:



This diagram is not drawn on the 2mm. standard but rather in large on graph paper in order to emphasize its proportional nature. It can readily be seen that (for a given standard note-head size) the spacing for the three groups cannot possibly be the same while maintaining proportionality. A 3-phase expansion requires wider line spacing than a 2-phase. If the 2-phase notation requires 2 mm., then the 3-phase requires 3 mm., and the 4-phase 4 mm. If this regime is not followed, we encounter a 'distortion' from strict proportionality. When such departures are made by various reformers they should be justified because proportionality is held 'in high regard.'

2-phase staff notations are also called '*chromatic*' staff notations. A large majority of the proposed systems fall into this camp, namely numbers #11 to #35. Chromatic notations require six 'layers' or seven 'lines' between the octave. However, these parameters can be variously 'expressed' by a line, a blank space, a broken or dotted line, or a 'ledger line.' There are thus more possible varieties of 2-phase staves than there are 3-phase or 4-phase patterns. The latter group is so 'compact' or simple that it forms a useful 'laboratory' for understanding the general behavior of 3-phase and 2-phase patterns.

3-phase staff notations are grossly under-represented in this survey. Only one instance is noted, #2—a particularly bad version of this approach. 3-phase proportional staves require four 'layers' or five 'lines' between the octave.

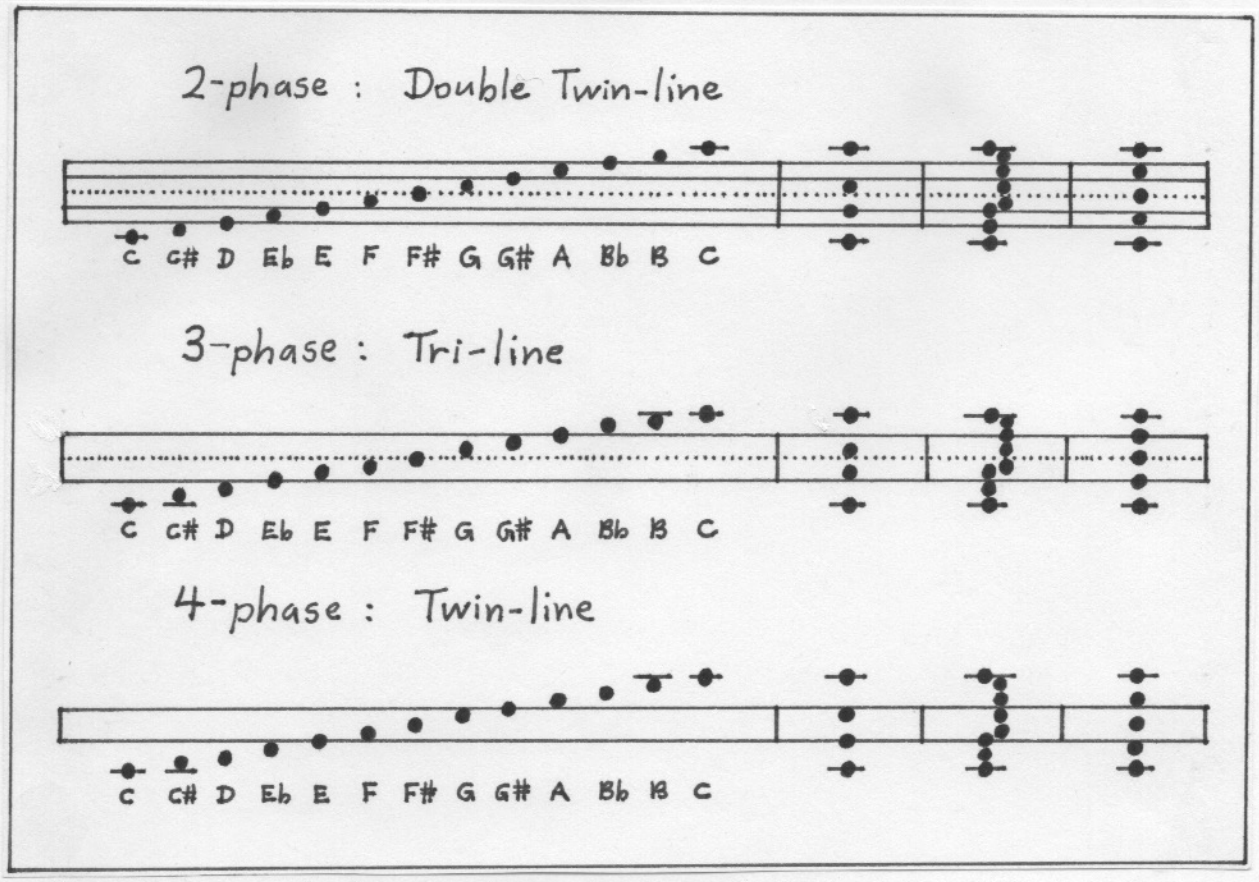
4-phase staves are represented by numbers #1 and #3 to #10. These systems require three 'layers' or four 'lines' between the octave.

Proponents of the 2-phase systems argue that they are the easiest to read. One need only recognize and distinguish *lines* and *spaces*. In the 4-phase systems we need to recognize *lines*, *spaces*, *touching below* and *touching above*—four positional variables instead of

two, making it harder to read. The 3-phase systems mediate between these two extremes. Proponents of the 4-phase staves counter with the argument that theirs are easiest to read because they have the least number of necessary lines. With the chromatic notations one must deal with a lot more lines per octave than the 4-phase approach. Again, the 3-phase systems are interesting in that they sit more in a middle position between the two extremes.

I have concluded that there does exist an *optimal proportional version* for each of the three groups: 2-phase, 3-phase, and 4-phase staff configurations. Instead of exhaustively arguing my reasons for these decisions here, I will justify them later and simply present representative examples of the three groups. The 2-phase or chromatic staff is called '**double twin-line**,' the 3-phase '**tri-line**' and the 4-phase '**twin-line**.' My disappointment with the survey stems partly from the fact that only the 'twin-line' paradigm was actually represented in the collection. A couple of close variants of the 'double twin-line' *were* given. The 'tri-line' was totally ignored. Yet it has certain special properties that are worth considering.

The following diagram shows the three 'best constituted' of the proportional staves, showing the chromatic scale, the C major chord, the C major scale, and the diminished chord so structurally 'prominent' in the harmonic architecture of 12-et.



These three approaches have certain superior ergonomic features. First of all, they are fully proportional. Moreover, only one ledger line is needed (though not necessarily

constantly used). It marks the position for C and serves to delineate the multiple octaves. In 'counter-balance' the F# line is highlighted by 'diminution' into a dotted line. The emphasis on C and F# promotes the ability to find one's 'place' in the gamut much more easily—as an essential part of the diminished structure. No **bold** lines are necessary at all, only the one dotted line. These three archetypes demonstrate the best balance between the extremes of 'too many lines' (lost in a sea of lines, e.g. #31) and 'too many spaces' (lost in space, e.g. #1 or #2). The particular layout of the lines promotes the greatest ease in finding 'your neighborhood' in the scale.

MY CHOICE OF THE 'SIX BEST'

The 'optimal' *double twin-line* is a variant of the group numbered #16 to #22. Only one change need be made—the F# line changes from a solid to a dotted line. I find it amazing that no one considered this simple alternative, since it improves readability dramatically. At any rate I chose #16 as a representative of this group and as one of my 'six best.' Another variant is #30. Here the optimal pattern can be found by changing the broken F# line into a dotted line and replacing the bold C line with a ledger line. In both #16 and #30 we see an over balance of lines—too many lines, most apparent on the grand staff. The shift to the *double twin-line* rights the balance and creates a chromatic layout that 'can't be beat.' My third choice amongst the chromatic notations is #11 for the simple reason that it demonstrates the interesting variety of decent layouts that are possible in the 2-phase approach.

Amongst the 4-phase staves, I chose #7 and #6 as the two best examples. #7 was chosen because it is faithful to the proportional ideal. #3 is much like #7 but the author unnecessarily superimposed a 6-6. Amongst the notations that ventured into alternative note-heads (#4, #5, #6) I chose #6 because of the superior 'readability' of triangles over half-ovals.

Finally, among my 'six best' I chose #2, because it alone 'defiantly' demonstrates a 3-phase proportional notation, even though his particulars are pretty dreadful. At least his example reminds us of this possibility.

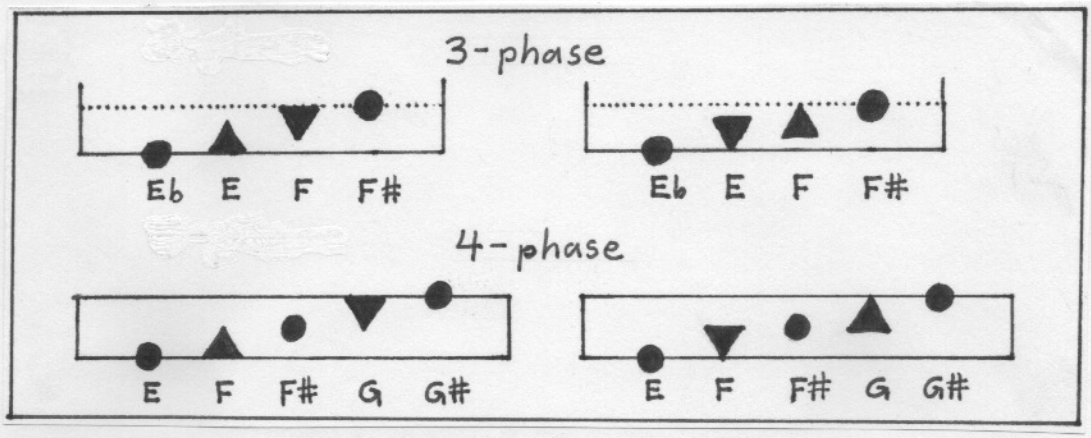
ALTERNATIVE NOTE-HEADS AND DISTORTIONS OF PROPORTIONALITY

Lest I praise the three 'optimals' too much, we must not neglect the observation that an octave requires more 'vertical space' in these proportional scales than it requires on the standard staff (using the 2mm. line standard, 12mm. instead of 8mm.). Proponents of 4-phase notations who oppose the chromatic notations describe it as 'the big spread' and counter with a means of 'collapsing' the 4mm. twin-line back into a 2mm. line by introducing alternative note-head shapes. The resulting staves embody the ultimate in 'compression' (the octave in 6mm. rather than the standard 8mm. or the chromatic 12mm.). However, they pay a high price in radically skewing the proportionality. Fully proportional systems that use alternative note-heads were unfortunately entirely omitted from the survey, even though they are amenable to 3-phase notations even more than 4-phase. Amongst these 'collapsed' systems the best is #6 because it recognizes the utility

of the triangle as a contrast to the oval—angularity versus curvature. But unfortunately this approach again over-emphasizes a 6-6 framework.

TRIANGLE ORIENTATION AND PROPORTIONAL SYSTEMS

To my dismay no examples were given to examine the question of triangle orientation. Undoubtedly the triangle is the best alternative note-head shape to contrast with the oval or circle. However, it has two possible orientations, only one of which was given in the survey. But it is a matter of debate which orientation is better. In the following diagram (drawn at double scale) the two orientations are illustrated by segments of the 3-phase and 4-phase gamut. These examples use the alternative note-heads within the context of proportionality. To my judgement, the alternative on the right (not represented in the survey) better represents the visual ideal of proportionality.



This whole discussion of triangular note-heads is a bit academic, since, in a proportional notation there is really no need for them at all. Note that they were never introduced into the chromatic notations, only the 'collapsed' 4-phase notations. Sometimes they are introduced in order to emphasize a 6-6 pattern. However, there is really no reason to emphasize this 6-6 pattern. It is already clear enough in the chromatic notation, where the lines represent the one whole-tone scale and the spaces represent the other whole-tone scale. The 'double six' pattern is also readily apparent in the classic proportional *twin-line* notation, so that there is no need to re-emphasize it some more by additional alternative note-heads, colors, etc. I will thus restate my initial presumption that alternatively shaped note-heads are undesirable and best avoided. Although these notations may look quite pretty, they are slower to write—it is better to stick to ovals and circles.

KEYBOARD TABLATURES AND VERTICAL LINES

As a guitar player, I worked for a time with guitar tablatures. They are easy to use once one gets used to them. A set of indications informs you which string to press and which fret to press (using numbers or letters). However, over time, I realized just how stingy they are in relating real musical information. Eventually I found that it was best to use them in conjunction with the normal staff, although it takes up a lot of space to pair these two approaches together. Now I have reverted back to using the normal staff and

scribbling in some of the tablature 'info' onto it, in spite of the clutter. I fear the same sort of reaction to keyboard tablatures. In this regard, a vertical orientation makes sense as a visual keyboard tablature, the approach used in #9 and #29. However, it is too radical a shift for me, and made even worse by imposing a 6-6 regime over it (as in #9). Although a tablature may be useful for some people, the standard staff does a much better job of informing the player of the 'intentionality' of the composer. Although #9 and #29 are indeed extreme examples of *notation becoming tablature*, many of the notations in this collection exhibit this same 'feel.' They move in this direction.

ADAPTABILITY TO MICROTONAL SYSTEMS

The three 'optimal' approaches given and also the others in this collection could be adapted to enharmonic inflections simply by 're-introducing' the sharp and flat signs. Using 31-et as a desirable system, the staff position defined by C#=Db in 12-et could simply be marked by a sharp to mean C# or a flat to mean Db. Moreover, the C position could be augmented with the standard sign for semi-flat or semi-sharp, etc. In this way, all of the pitch material of 31-et can be represented. It is even easier with 24-et (quarter-tone system). One need only add an appropriate sign for a quarter-tone raised or lowered. A more complex system like 53-et (and just intonation) is more difficult to deal with, though not impossible. But one thing must be remembered in these microtonal wanderings. When we add these signs to the chromatic, 3-phase, or 4-phase notations, the staff is *no longer strictly proportional*. Setting up a truly proportional staff for 12-et is comparatively easy (it comes out of six lines and six spaces). But a strictly proportional staff for 31-et or 53-et is a task of nightmarish dimensions. Even 19-et is too difficult for me to 'get a handle on.' So we are left with the open question whether or not these 12-et proportional notation systems are more useful than the standard staff for notating 31-et or 53-et. Personally, I think the jury is still out. I am left with the uncomfortable conclusion that this set of proportional notations is strictly intended for 12-et and has a somewhat diminished usefulness for the more harmonically resolved tuning systems. Nevertheless they still prove useable. These proportional scales do not form any real impediment to the exploration of microtones. In fact, they accommodate 19-et and 31-et quite well, and these two are the most 'gifted' of the practical microtonal systems. 53-et and complex forms of just intonation require 'royal treatment.'

SOME SPECIAL MENTIONS

Some proposals deserve special mention for unique features. #10 uses a highly creative addition to the oval note-heads in order to decrease line spacing from 4mm. to 3mm. in a 4-phase notation. Unfortunately, with my poor eyesight, the position of the slash-mark is often difficult to see. #25 deserves special mention for the perversity of using *two* bold lines between the octave when none are actually needed in an ergonomic design. #26 and #34 deserve mention as tantalizingly close variants of the *double twin-line* notation. #29 gets credit for having the courage to use a dotted line in the staff. When this notation is changed to horizontality it can more easily be observed that the line layout is almost the same as the *double twin-line*—the ledger line is replaced by a broken line and the C is transposed to a different position on the staff. #36 deserves special mention for its quirky

irregularity and the use of a 5mm. line spacing (divided 2+2+1). Finally, #37 gets a mention for its truly baroque complexity and the outrageous use of a 1mm. line spacing.

DIFFICULT DECISIONS

Sooner or later we must face the difficult question over which approach is better for proportional staff notations: 2-phase, 3-phase, or 4-phase. Each has strong and weak features. In my own experience, I find the 4-phase a little harder to read because (perhaps) there are too *few* lines. On the other hand, the 2-phase approach has maybe too many lines, but this is debatable. In terms of sheer practicality, the 3-phase has the edge in its medial position concerning lines and spacing. The 4-phase staff emphasizes the three-fold symmetry of 12-et since its lines give the augmented triad C-E-G#. The 3-phase staff rather highlights the two-fold and four-fold symmetry of 12-et since its lines give the pitches of the diminished tetrad C-Eb-F#-A. This arrangement of lines is probably the most practical format for 12-et. On the other hand, the 2-phase staff shows *all* the forms of symmetry *explicitly* in its lines. It has the two-fold symmetry between C-F#, the three-fold in C-E-G#, the four-fold in C-Eb-F#-A (with the Eb-A on the 'favorably placed' spaces) and the six-fold in the whole-tone scale C-D-E-F#-G#-Bb. The 3-phase and 4-phase staves can even be 'extracted' from the original 2-phase by omitting certain lines. Due to these special properties the 2-phase staff probably has the edge, but the 3-phase version is more concise. I confess that it is most difficult to choose between these two alternatives.

MY OWN ENVIRONMENT

My assessment of these proportional notation proposals is inevitably influenced by my own 'notational requirements.' For many years I have been playing music within the 53-et and 31-et environments. I have a strong interest in Asian music, and 53-et allows me close approximations of the scalar approaches of China, India, Iran, Turkey, the Middle East, and North Africa. Consequently certain of my instruments are set up in subsets of this 'quasi-just intonation,' namely my tamboura, sitar, adapted 53 guitar, and my two harps that I use for setting up experimental tunings. I access 31-et (the old 'extended meantone' of renaissance-baroque Europe) on my beautiful re-fretted classical guitar. I have trained my voice to sing along with these various microtonal resources, a source of great pleasure for me. In fact, the enharmonic is most singable and forms the very soul of Middle-Eastern music. In addition, I access 12-et through my tenor mandolin, which I use mostly for playing classical string music (I especially like the solo 'cello pieces by Bach on mandolin). Moreover, I've found that my recorders require (for practical reasons) a more-or-less quarter-tone notation for the profusion of their fingerings. Finally, I sing in a choir that uses what can charitably be called 'flexible intonation.'

Given my rather profuse tuning environment, one might expect that there would be some problems with notation, but this is not the case. For me, the problems have already been worked out many years ago. Each system, 53, 31, and 12 has its own unique solutions that arise out of its harmonic 'architecture.' Since sharps and flats were originally invented for the meantone system, no conversion is necessary. The standard staff notation

is *directly* readable as 31-et. For the increasing asymmetries of 53-et, a slash sign (for comma alteration) is necessary on top of the usual sharps and flats. I normally work with all of these systems together. In fact, I find it especially interesting to transfer musical material between the systems, watch how the notation mutates, and (even more interesting) listen how the character of the music is subtly (or not too subtly!) shifted.

The main point to grasp in all this is that I love the enharmonic and I'm not a keyboard player except incidentally. Consequently notations that are *keyboard specific* and that eliminate enharmonic differences are not very useful to me. If my assessment of these notations is a bit critical, perhaps this is the reason. For me, the negation of the enharmonic in the notation is a bit sad, since I hear it in my 'ear' and use it on my instruments. However, I *can* empathize with the many musicians who play fixed-pitch instruments that *don't* allow enharmonics and who have nurtured the mad desire to purge their notation of them. They may not even have a *conception* of an enharmonic let alone a vivid image of it in their 'ear.' I have no problem with a keyboard notation that accomplishes this aim, as long as it is not imposed on those of us (perhaps even the majority) who still cherish our 'sharps and flats.'

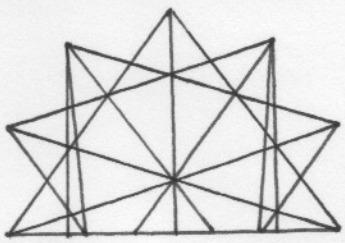
PROVISIONAL CONCLUSIONS

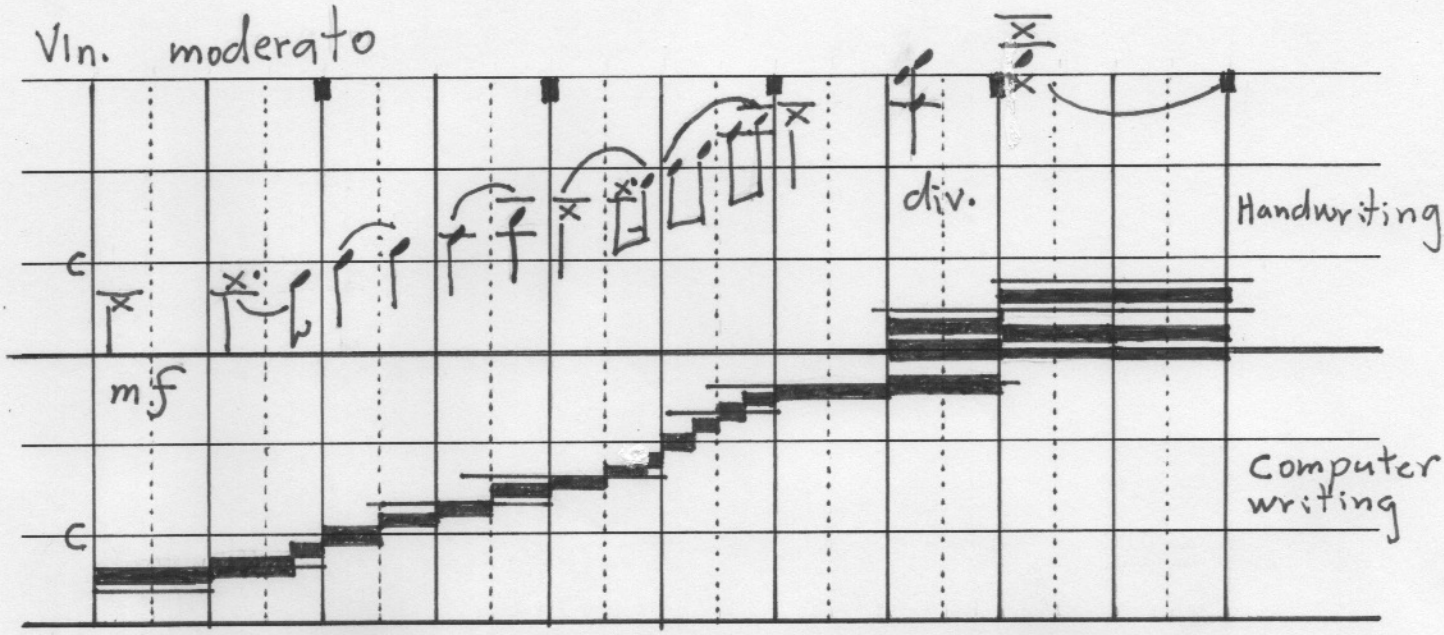
Hopefully this introduction has clarified my reactions to the group of notations as 'examples within a wider context.' What follows is a little exploration of 'pattern ergonomics' in assessing readability. The rationale is simple enough: We want to find the pattern of lines and spaces that *mediates* between 'too many lines' and 'too few lines.' We want this pattern to exhibit the inherent symmetry of 12-et, and not to become 'unbalanced' through an unfortunate placement of the lines and spaces.

As I investigated the 37 proposals given and the various 'relatives' that they imply, it struck me how much this study reminds me of old investigations of the Chinese *I Ching* that I had made many years ago. There it was patterns of lines and broken lines (yang and yin). Here it is lines, bold lines, broken lines, dotted lines, and spaces (no lines, with their optional ledger lines). In both cases we are exploring *sets and permutations*—an effort to find the fortunate 'middle path' between two unbalanced extremes. The reward is a certain satisfaction one gains after the group as a whole has been 'digested' and interpolated together. Archetypes of 'balance' emerge with their 'relatives' accompanying them in a hierarchy of worth—'fortunate' and 'less fortunate' members of a set of possibilities.

Further comments are made in relation to specific proposals numbered #1 to #37.

-June, 1999, Amsterdam, Euroland





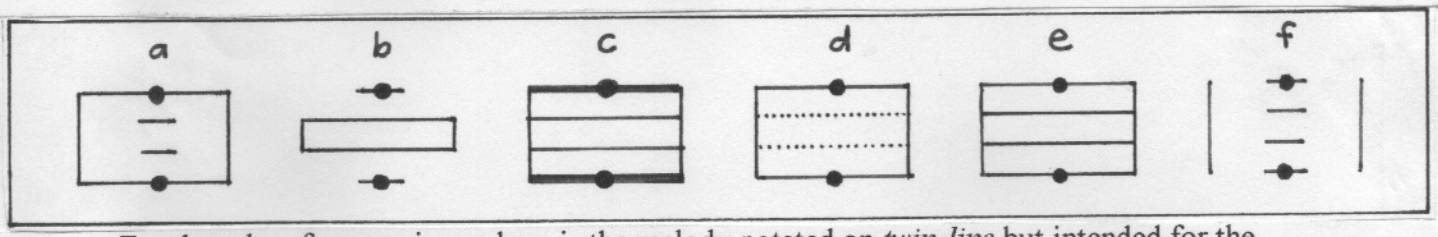
#1
Classification: 4-phase, symmetrical

I have tried to notate the 'computer writing' form of his notation as well as the handwritten form, since it appears to be important for the inventor. There is much that I did not like about this notation. First of all, he uses X's as alternative note-heads in a 6-6 format. Consequently, the way of notating time values must be somewhat reorganized. Unfortunately, his approach measures beats (by vertical lines and dotted lines) but gives no real indication of the bar-lines or the time signature. I took the liberty of adding little boxes above to indicate bar-lines. Also, I added a small C in position to indicate 'middle C' on this 'grand staff' or continuous staff. It appears that the author also has no way of marking the key signature. This could be done by placing some sign on the G for the tonality. I have also notated it with all the 'flags' pointing downward. This orientation need not be the case; they could all point upward or in some mixed configuration according to need. I found this notation rather abstract and difficult to read because there are too many spaces with ledger line—a classic example of a notation that is 'lost in space.'

Evaluator: Siemen Terpstra Date: May-June 1999

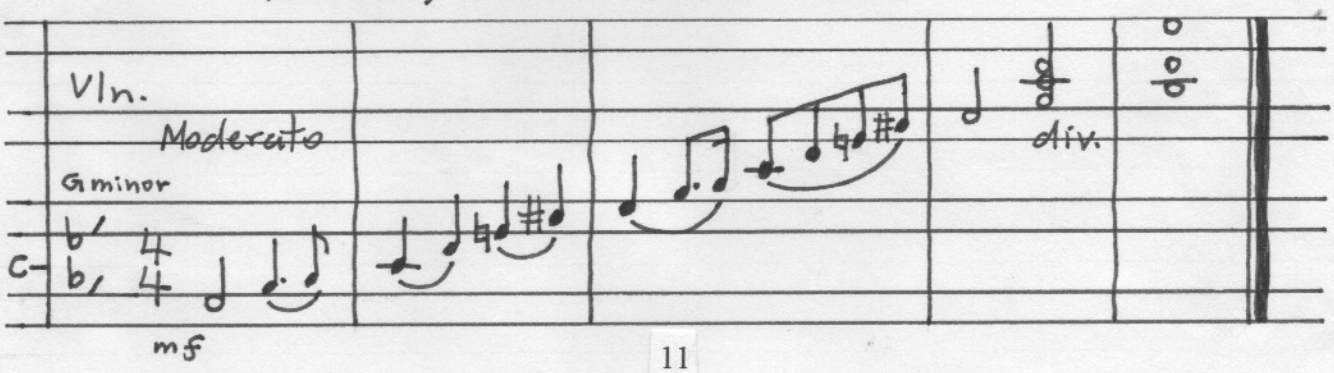
THE SET OF 4-PHASE SYMMETRICAL STAVES

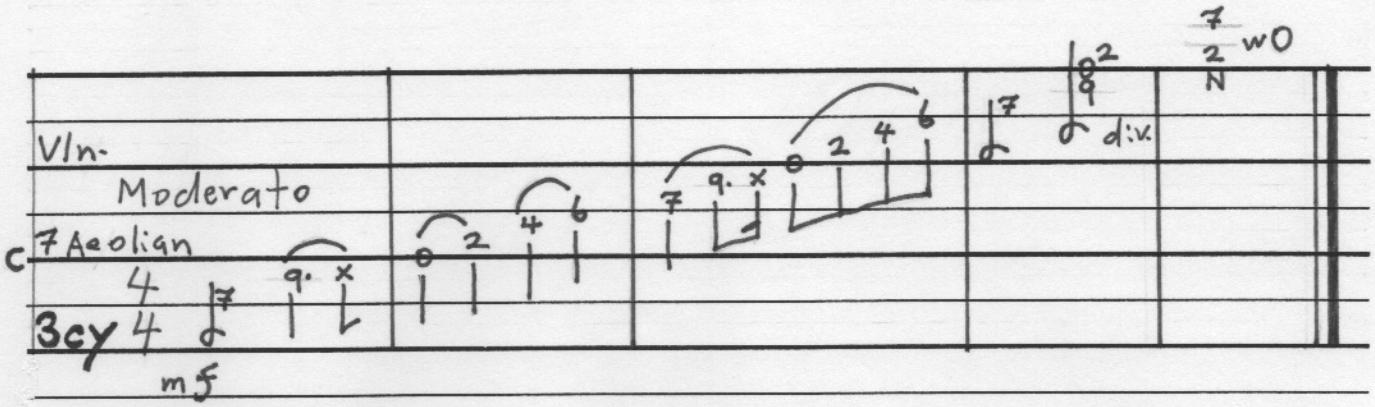
#1 is a member of a set of 4-phase staves that exhibit symmetry. Such staves are more desirable than asymmetrical staves because the 12-et tuning system is itself symmetrical and the notation should reflect this fact. For a look at asymmetrical 4-phase staves, see #8. These examples below all place the reference 'C' on a line (i.e. line orientation). For a look at the set of staves that put C on a space, see #9. Six staff possibilities are shown, and they are marked by the letters **a**, **b**, **c**, **d**, **e** and **f**. The first one, **a**, is essentially notation #1. Note its peculiar relationship with **b** (the optimal, *twin-line* notation). They are like 'inside out' versions of each other. Whereas **b** has the easiest readability, because there is only one ledger line (on C), **a** is much more difficult to read because there is too much *concentration of space*. The more fortunate **b** is also the pattern for #3, #4, #5, #6, and #7. #1 could be improved by adding the inner lines, as **c**, (a method followed by #10) but then the reference line must be bold. A better solution is shown at **d**. If #1 was modified to **d**, it would be much easier to read. The examples **e** and **f** were given in order to illustrate the extremes of 'too many lines' and 'too few lines' in the staff. It is debatable whether or not these two examples are even symmetrical. At any rate, they are unworkable. In conclusion, the best modification of **a** is **d** if we want to keep its general character. However, the very best symmetrical version is **b** (the *twin-line* staff).



For the sake of comparisons, here is the melody notated on *twin-line* but intended for the 53-et tuning system or traditional 5-Limit Just Intonation. The process of 'definition' involves re-introducing the specifications that were 'eliminated' in 12-et. Thus the music has a *real* key signature and accidentals, just the thing that the 12-et notations were trying to 'hide.' The strange looking key signature results from the situation that the G minor scale in 53-et is written G /A Bb C D Eb /F G. It carries not only two flats but also two 'comma-raised' notes—indicated by slash signs. (Don't ask me to justify this here!) Moreover, this version is *not* the only possible just intonation G minor scale. Whatever mode or 'color' is used *needs* to be specified in the key signature. By the way, violins *are* played in just intonation (with comma or *sruti* inflections) in India and other corners of Asia; hence a just intonation notation is not purely academic—it is useful. In this example, the natural sign placed on E is not strictly necessary. Arguably, it is redundant, but it makes doubly clear the intentions of the composer. But the sharp sign in front of F# is absolutely necessary however, so that the player knows that F# is intended and not Gb. The philosophy here is to make the composer's wishes as obvious as possible, and not to hide them as the new notations strive to do. In this spirit, the key signature is *explicitly* stated at the beginning so that the player has less room for confusion.

Twin-line, 53-et or Just Intonation





#2
Classification: 3-phase symmetrical

We have here a very spacey and poor notation, but it is given emphasis because it is the only 3-phase notation in the whole survey. I found it quite difficult to write; in fact, I had to pencil in the missing ledger lines in order to make it even possible. Later they were rubbed out for appearance sake. The author delights in inventing a 'secret language' to replace the common terms that we all know (in order to promote communication?). Replacing the oval note-heads with numbers and letters is especially unfortunate—made worse when they must be written and read *very small*. The recognition just when a number is 'touching below' or 'touching above' on an invisible ledger line is practically impossible. Again we are *lost in space*. This notation is only an impractical abstraction. The use of register symbols ('1 cy, 2 cy,' etc) is typically abstruce—'cy' means cycle. Why not simply mark the position of middle C (the function fulfilled by the normal treble and bass clef)? The naming of the key signature '7 Aeolian' also seems a bit absurd, since the written melody is in no way this particular Greek Aeolian mode. (The actual Greek mode is quite microtonal!). It is better simply to state G- (G minor), G+ (G major) or simply G (the tonality) or some *mark* or sign defining the pitch of the tonic. What is the point in renaming a semitone a 'semit'? Sadly, this notation is impractical enough to give 3-phase notations a bad reputation.

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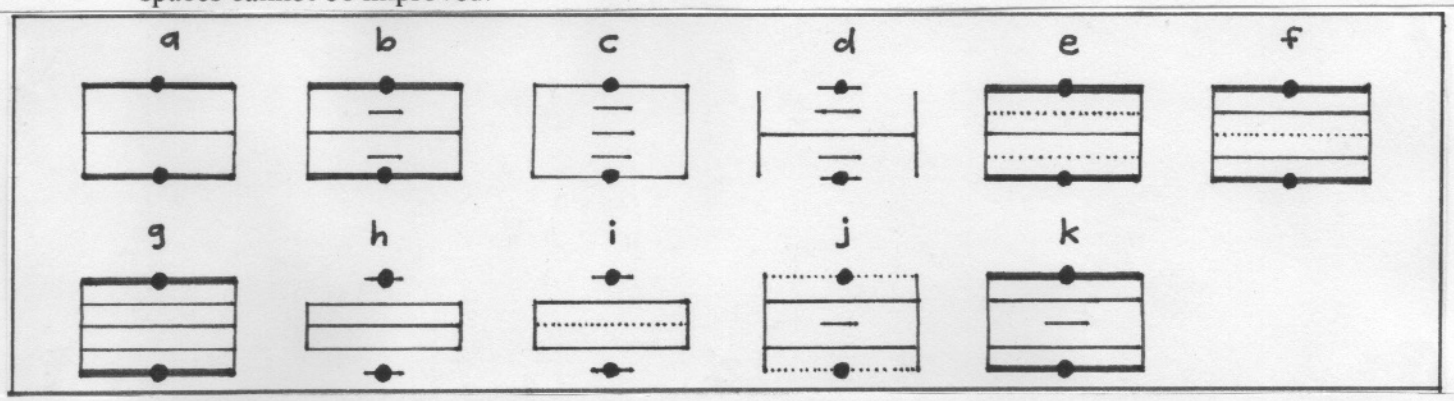
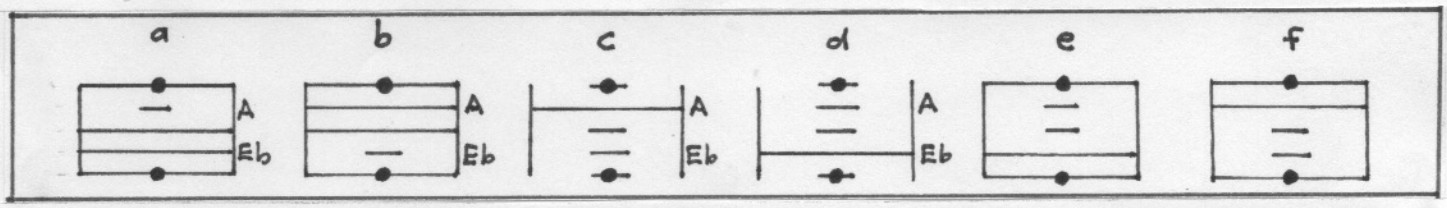
THE SET OF 3-PHASE SYMMETRICAL STAVES

#2 is a member of a set of possibilities that have great promise. They are here numbered from **a** to **k**. #2 is essentially **a**. Only **c** and **d** are even more 'spacey.' #2 at least implies the ledger lines marked as **b**. Yet the inventor expressly omits them. The staff would be greatly improved while maintaining essentially its character by using **e**, **f**, or **k**. These three are already quite practical and improve the readability by much. Number **g** was included to show an extreme overbalance of lines. No, the best of this group is **h**, **i**, and **j**. The first two are almost equal, but **i** still has the edge. It is the ergonomic *tri-line* configuration. Number **j** is interesting since it is the 'sister' of the *tri-line*. When tessellated into a Grand Staff, it makes the same pattern as the *tri-line*. But the C and the F# have exchanged places between these two notations, **i** and **j**. The same type of relationship can be seen between others, for example between **c** and **d**. The *tri-line* has the edge because no bold line is needed at all and because the balance between lines and spaces cannot be improved.

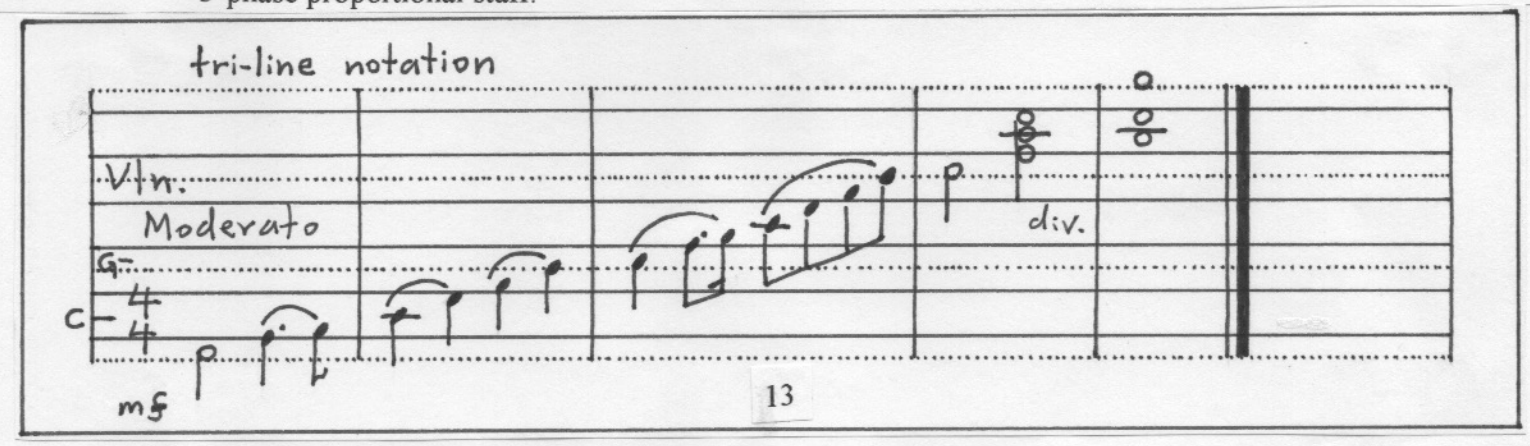


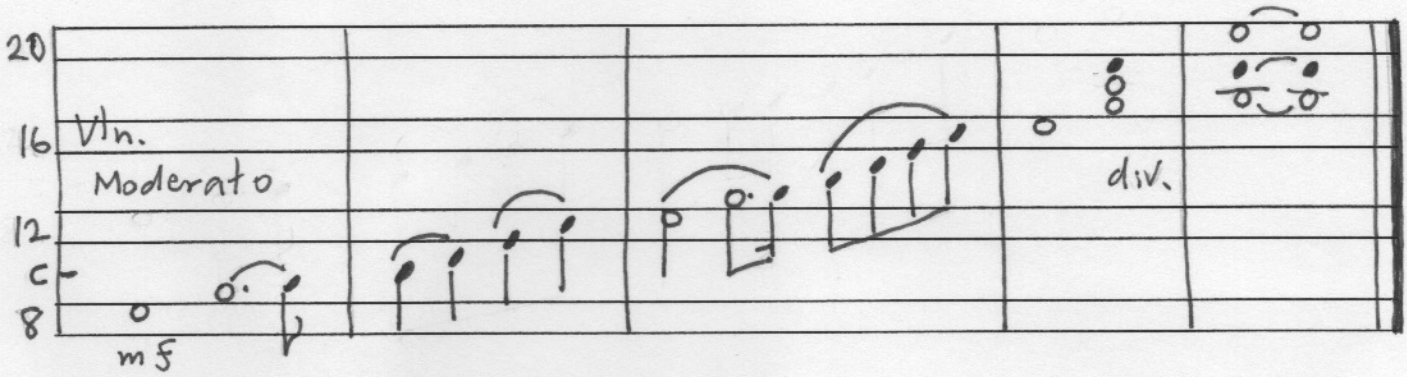
THE SET OF 3-PHASE ASYMMETRICAL STAVES

In the context of staff configurations, symmetry occurs when the reference C is sitting on a symmetrical position of the tuning system. However, this is not necessarily the situation. In the case of **a**, **b**, **c**, and **d** below, the staves are 'oriented' around A and Eb rather than C and F#. In a sense **a** and **b** are 'transpositions' of the symmetrical *tri-line*. **c** and **d** are 'transpositions' of the symmetrical **c** (and **d**) shown above. On the other hand, **e** and **f** do not have this 'transposed symmetry' structure at all. They are *fully asymmetrical* and unbalanced. Needless to say, this staff configuration is not recommended.



In order to show a radical improvement over #2 and the real worth of the *tri-line* notation (for making comparisons, and for the record), here is the reference melody notated on the 3-phase proportional staff:





#3
Classification: 4-phase symmetrical

This notation deserves praise for employing the classic proportional 4-phase twin-line staff that is also used by #7. For some perverse reason, though, he refuses to write the ledger line for pitch C, using the ledger line only when B or C# is intended. Consequently, the C 'hangs in space' and is easily mis-identified as Bb or D. However, this relatively minor detail is not the only problem with this notation. Besides the usual unclear register signs and the lack of a key signature and time signature, the inventor has succumbed to the fatal attraction of coloring half the notes according to a 6-6 tablature pattern. From the reference material, it appears that he indeed intended his notation as a tablature for 6-6 keyboards. This procedure is 'fatal' because it necessitates tinkering with the standard notation of musical time values. In his 'improvement' half the quarter-notes look like half-notes, the half-notes are written as whole-notes (half of which are filled in), and even eighth-notes and sixteenth-notes come in open and filled in varieties. Consequently, in order to read this notation I must 'unlearn' the perfectly reasonable standard system for notating time values. And for what? All this confusion is generated just so that we can have a *tablature for 6-6 keyboards*. Now I have nothing against 6-6 keyboards as such, or tablatures for them. But they should be clearly designated as such and not disquised as a 'universal' notation suitable for all instruments or even for normal keyboards. Most keyboards are 7-5 and most keyboard players balk at the notion of 'unlearning' the standard time value symbols, which work perfectly well. For this reason, notation #7 is preferred, since it does not necessarily require the rethinking of time values and it isn't restricted to a 6-6 keyboard format.

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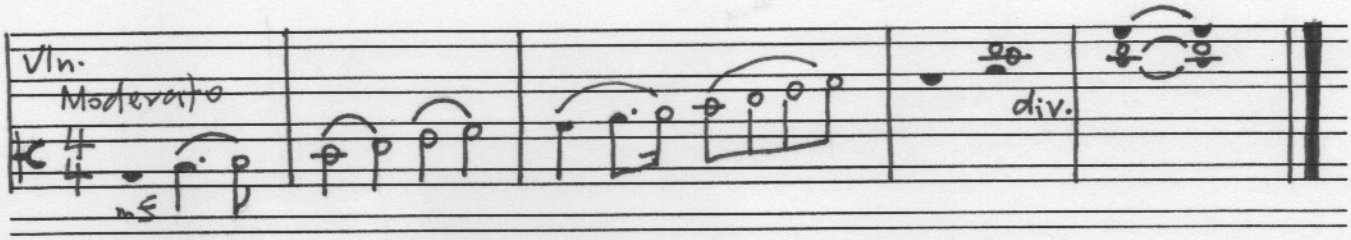

#4
Classification: 4-phase symmetrical

This notation is the first of several that compress the 4mm. proportional line spacing back down to 2mm. by using alternative note-head shapes. While still proportional, these notations are so 'compacted' that even normal chords have the appearance of cluster-chords. Intervals of a minor third or smaller must be positioned on opposite sides of the stem. The *appearance* of proportionality is also somewhat skewed by the 'sticker' notes that do not have the proper proportional placement (seen, for example, in #7). This notation indicates the register (middle C marking) and the time signature, which is laudable. Unfortunately, he also imposes a 6-6 color format on the notes, so that the appearance of time values *must* be altered as in #3. The same criticism about the confusion of 6-6 tablatures and universal notations applies here as for #3. The much valued traditional system of marking time values is distorted for the sake of a 6-6 tablature. To my mind, this move indicates misplaced priorities. The author did recognize that this 'CS Twinline' notation '*might give problems*' for normal 7-5 keyboards. Therefore he amended it to the 'Chromatic-Diatonic System' or 'CDS Twinline,' notation #5. This notation, however, does not solve the problem of incompatibility with traditional time values. A much better solution is #6, where the traditional time values are at least possible (though he also did not follow them). I found #6 also superior in that triangles are easier to read than half-ovals. In small print, the half-ovals are sometimes hard to distinguish from normal ovals. Also, I don't see the point in renaming the whole-tone scale C-D-E-K-L-M-C rather than C-D-E-F#-G#-Bb-C. Possibly it is a means of eliminating all traces of the accidentals in musical theory. This notation is another in a series of 'part tablatures' that have limited universality because they are tied too closely to 6-6 keyboards.

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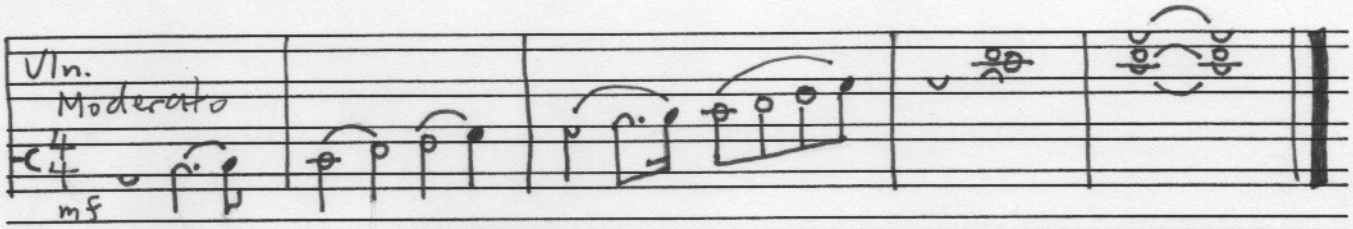

#5
Classification: 4-phase symmetrical

This notation is an alteration of #4. Recognizing that #4 is too closely tied to a 6-6 keyboard format, it is here amended for use on a 7-5 keyboard. Unfortunately, the main problem with #4, the need to amend the notation of time values, is not corrected. In effect, the notation has been shifted from a tablature for 6-6 keyboards to a tablature for 7-5 keyboards. The five black keys *must* have black notes and the seven white keys must have white notes irrespective of the traditional time values for white and black notes. The author intends his notation to be 'universal,' but it is really a 'semi-tablature' for keyboards. The universality could be enhanced by eliminating the 'tablature' element, as is done in #6. Then it would be only slightly worse than #6, since half-ovals are harder to read than triangles as a resource for alternative note-heads.

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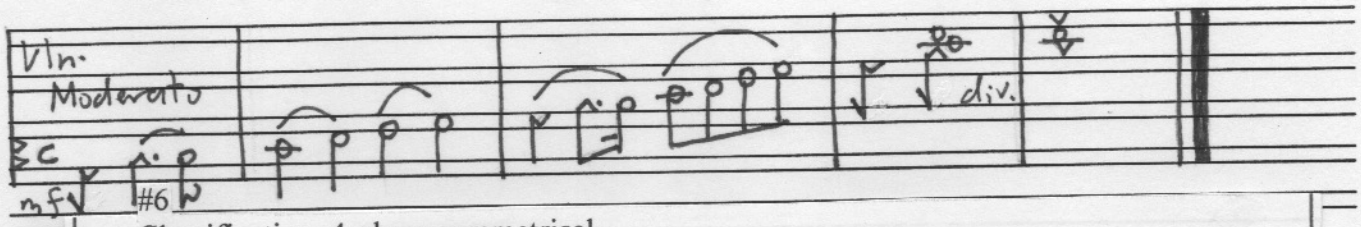
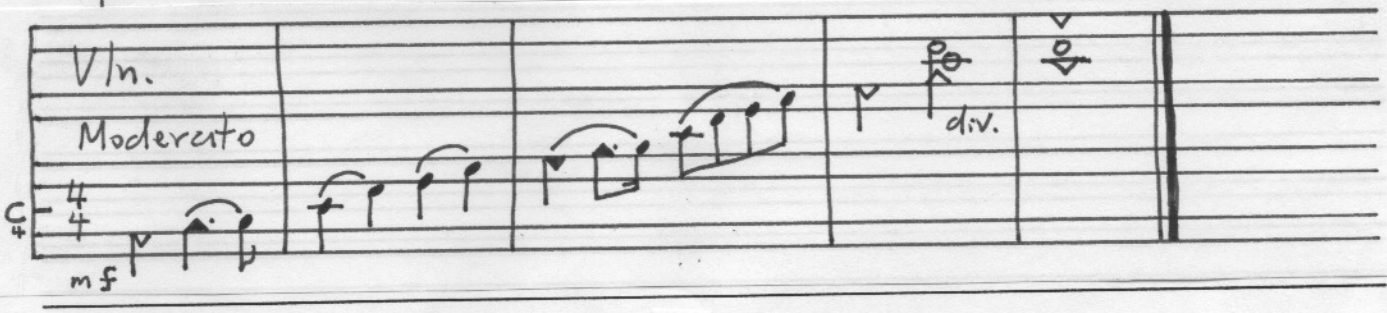


Classification: 4-phase symmetrical

#6 is potentially the best of the 'compressed' staff configurations since triangles are easier to see than half-ovals or other shapes, and because the note-heads are not tied to a 6-6 tablature color scheme. In other words, this notation can be used with the traditional means of notating time values. Unfortunately, the author then forfeited this opportunity for clarity by introducing new symbols for time values anyway—even though they are not needed! Apparently the 'improvement' consists of eliminating all black notes from the staff altogether. In order to do this, the half-note must be given a reverse flag which is hard to distinguish from an eighth-note flag. The quarter-note looks like a half-note. Due to the lack of filled in notes, the whole system of time values is harder to read. Why bother making these 'improvements?' I have chosen #6 as one of the best in this collection because it is the best of these 'compressed' 4-phase systems. However, its readability could be improved if the traditional system of time values were restored. The problems seen in this small group of 'compressed' notations (#4, #5, #6) is indicative of the whole survey. Each one has some potential, but each one is also seriously flawed in its present state. Choosing the best is a matter of choosing the least objectionable among several contenders.

MEDIAL COMPRESSION

For the sake of comparison, here is the melody notated on *twin-line*, but with 3 mm. spacing instead of 2 (as used above). That makes the octave 9 mm., comparing well to the standard staff of 8 mm. Maybe its just my bad eyes, but I find it easier to read. Also, in this altered version, I have used traditional time value notation along with the 'sticker' triangles. They *are*, after all, compatible. I think that the 'compressed' notation people have over-reacted to the wide (12 mm.) spacing of the chromatic notations in going for the 6 mm. octave. It's too 'compacted.' 9 mm. seems more practical, yet the same in its essential features. The 3-phase (*tri-line*) octave of 12 mm. could also be compressed to 8 mm. using 2 mm. line spacing instead of 3. However, this alteration does nothing to improve readability. In fact, it becomes *more* difficult to distinguish 'touching below' from 'touching above.' Consequently, I haven't displayed the altered version.



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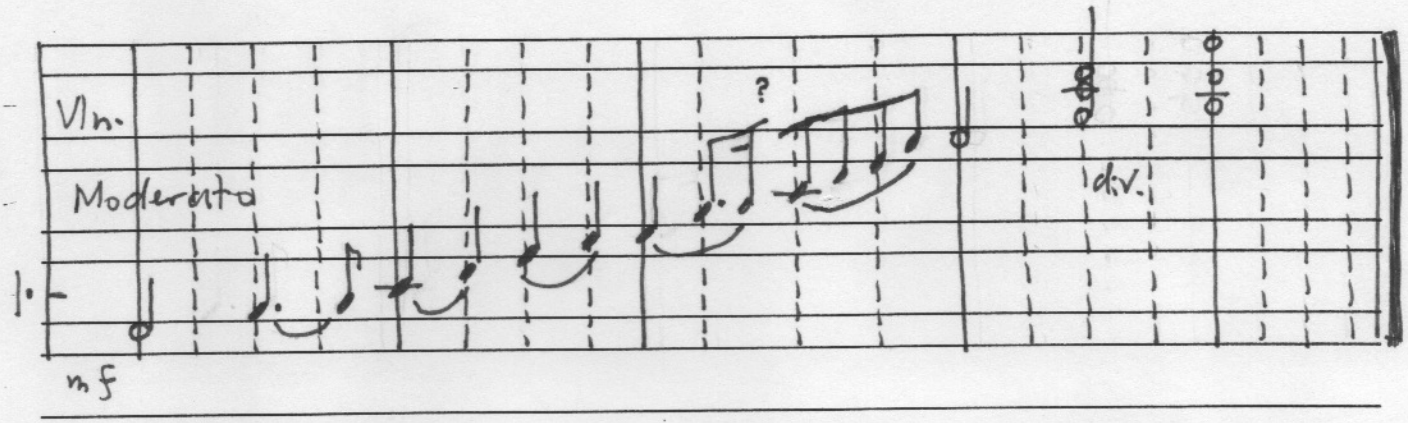
#7 AI 30C

Skapsi, George J.: *Panot* 29C

(LP 7C)



#7
Classification: 4-phase symmetrical

I have chosen #7 as one of the 'six best' since it presents an 'honest' or direct version of the 4-phase proportional staff. #3 did this too but imposed a 6-6 tablature over it. Of the three 'optimal' proportional staves, this is the most difficult to read, but then the other two versions were not given at all in this survey. However, just because I approve of the staff does not mean that I am sympathetic to his other 'reforms.' The register symbols are unclear. The practice of writing the notes over the bar lines (plus the other pulse lines) is ill advised. Why should all rests be indicated by a single symbol? The author has invented a very complex and detailed 'secret language' based on contractions of Latin to *rename* all the parameters of music. For example, a specific note is called a 'vinot'—short for 'vibrationis nota,' etc. Why bother? To aid communication? Such useless intellectualizing does not further the cause of making music notation easier to read or comprehend. It only creates yet another private or 'secret' language, a tendency that is the scurge of 20th century culture. What we need is appropriate and communicable means, not more empty intellectual constructions.

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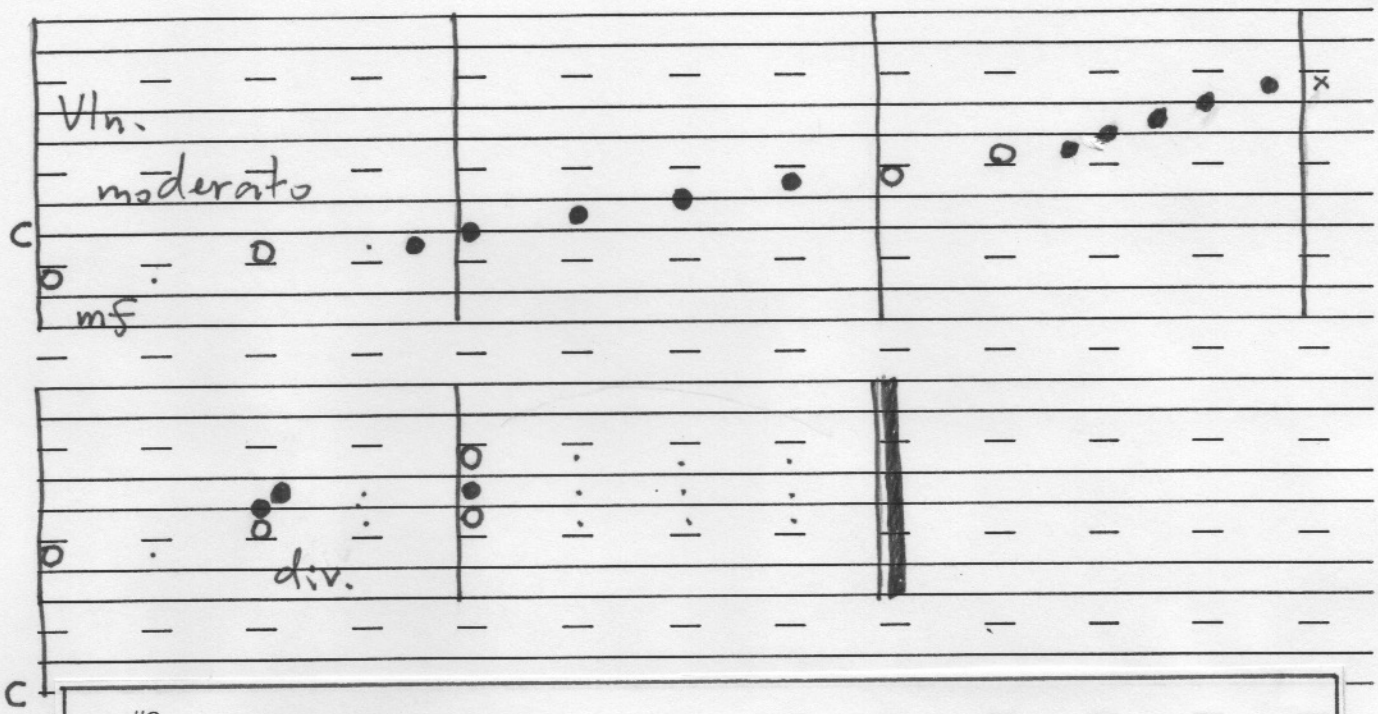

#8
Classification: 4-phase asymmetrical

#8 is interesting for two reasons. First, it is the only example of an asymmetrical 4-phase staff configuration given in this collection. The other reason is related to the first. The notation is actually a 'transposition' of the symmetrical *twin-line* only centered on G# (and its tritone D) rather than C. This notation is thus focalized around D-G# rather than C-F#. It shares this characteristic with others in the survey, namely #12, #15, #23, #28, and #37. The inventor may have discovered the 'symmetry on D' from observing keyboards (both 7-5 and 6-6) and its classic notation of 'sharps and flats.' The Dorian minor scale *is* the symmetrical mode. 12-et has this characteristic because it is a member of a family of musical temperaments (called '*meantone-related temperaments*') that exhibit symmetry around the 'meantone' or whole-tone (D, using C as reference). The differences between them result from differing amounts of tempering on the fifth. In the case of 12-et, they are tempered in such a way that the *circle of fifths* (starting on D and moving in both directions) meets at G#=Ab. In the case of 19-et, the circle meets at E#=Fb and B#=Cb. In the case of 31-et (by far the most harmonious of these three) the circle meets atA## and Gbb. Given these structural considerations, an argument *can* be made for locating the reference on D rather than C. However, the argument can also be countered: specifically, this D symmetry arises out of the temperament of *a C reference*. In addition, not all temperaments are of the group 'meantone-related.' For example, 53-et has very different structural characteristics—a different symmetry and overall *less* symmetry. The harmonic series (and its related 'just' tunings) are the ultimate—the last word—in asymmetry. It is probably wise to maintain a more 'neutral' stand and preserve C as the reference.

(continued over page)

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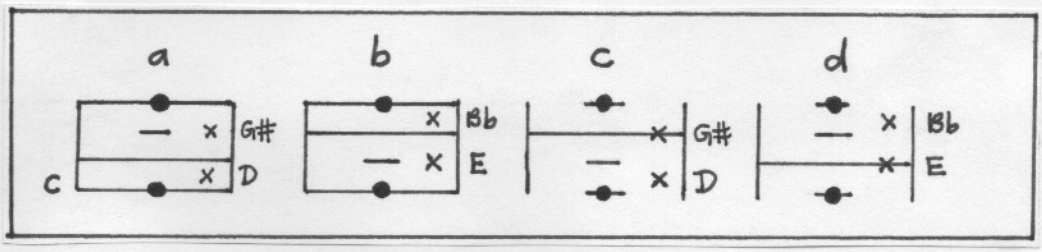
The author could possibly have developed #8 out of a recognition of the 'damage' done to the time value notation in his #3. Here he 'fixes' it some more and generates something even closer to a straight 6-6 tablature. Perhaps, seeing that the pitch spacing is proportional, he strove to make the temporal spacing also rigidly proportional. However, it's a bad idea because of its inflexibility. Notice how much more space was necessary to write the melody. It gets hard to see the difference between an eighth note and a sixteenth note. The use of this notation makes me appreciate just how practical flags are in reading rhythms. This notation is certainly very abstract! No register indications were given, but I have written in the middle C position. It has the appearance of a mechanical tablature for 6-6 keyboards. Question: When is a notation definitely *not* universal? Answer: When it is a tablature.

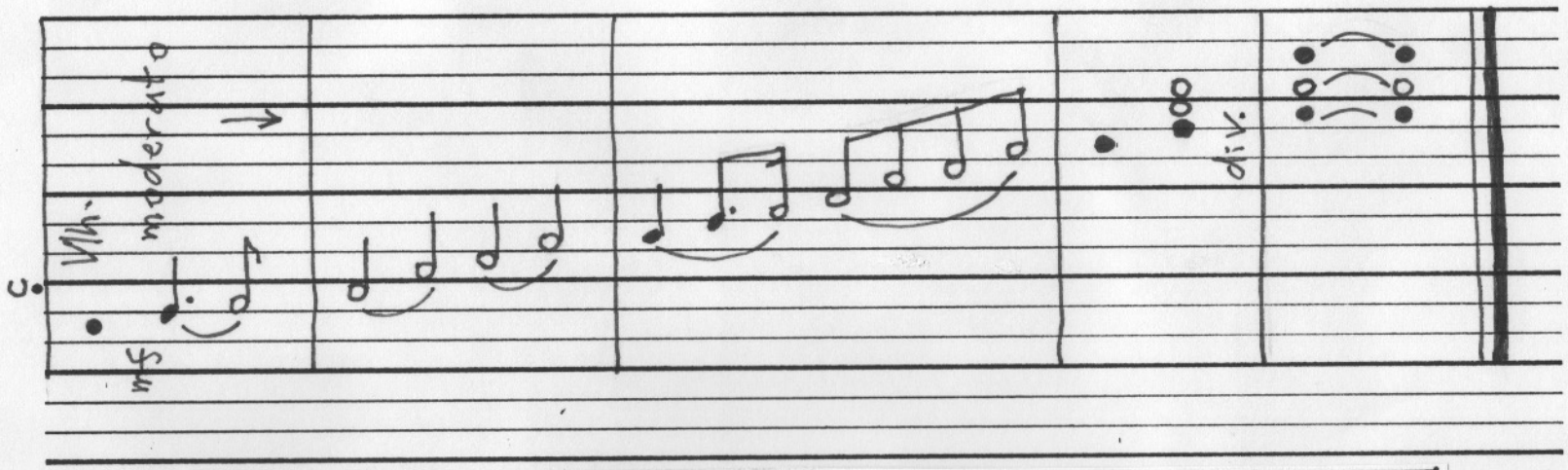
THE SET OF 4-PHASE ASYMMETRICAL STAVES

#8 is a member of a small group of staff configurations that are called asymmetrical because C is not on the point of symmetry. Instead, the staff forms a symmetry around another pitch, in this case G#. It is thus like a 'transposition' of a symmetrical staff onto a different reference pitch. The four staves below are designated **a**, **b**, **c**, and **d**. The proposal #8 is essentially **a**. It can be seen that a 'center' on G# would yield a twin-line type staff configuration. D would then form its tritone in the space position between the twin lines. Staff **b** is similar but now the orientation is around E (and its tritone Bb). These two staves demonstrate the *twin-line tessellation* but oriented around the other two positions of the 3-symmetry, the pitches E and G#. The same kind of relationship holds between **c** and **d**. While **a** and **b** can be derived from the *twin-line* (**b** in the diagram of symmetrical staves), **c** and **d** are derived from **a** in the diagram of symmetrical staves (page 11). These staves are thus 'unbalanced' in relation to the reference C but rather balanced toward another reference.



#9 Pot. Cornelis: ~~6-6 Klavar~~ 22c (LP9C)

Page:



#9
Classification: 4-phase asymmetrical, 'space' orientation

I confess that I had to turn it sideways in order to actually write the melody. We have here the strictest of 6-6 tablatures. The reference literature gave no indication of the necessary adjustment of the time value symbols. I have used the same system as #3 and #4, where half-notes look like whole-notes. It was not at all clear to me whether one is meant to read the music in an 'up' or 'down' direction on the vertical staff. Needless to say, this notation doesn't thrill me. But I found one aspect of it interesting. This one is the only 4-phase notation in the whole survey in which the reference (bold) line is C# while the reference C is *not on a line*. All of the notations thus far examined have put the reference pitch on a line. Thus #9 suggests a whole different group of staff configurations. In fact, #9 puts the reference C not even on a space, but on a 'touching above' position. It must be one of the 'quirkiest' or most eccentric staff configurations in this entire collection. Of course, this particular judgement is based on the bold line designating C#. There is some controversy over this matter. The author may have intended it for C, in which case it is like #10. However, the interpretation as C# is useful for reminding us that 4-phase notations could have the reference on a line, a space, or the other two positions, that I have called 'touching above' and 'touching below.'

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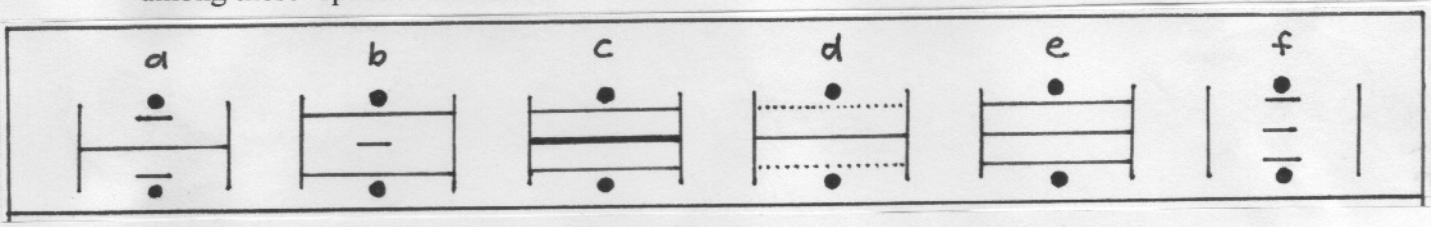
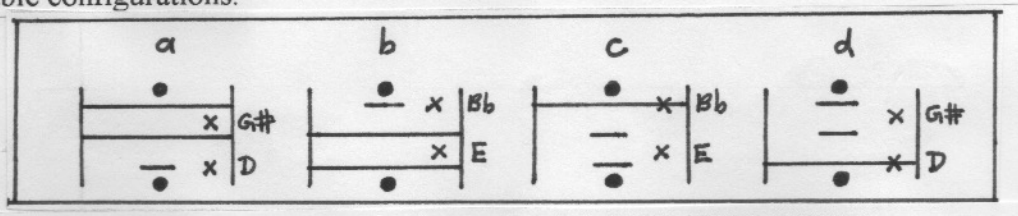
THE SET OF 4-PHASE SYMMETRICAL STAVES, SPACE ORIENTATION

Below are diagrams of the symmetrical staves that put the reference on a *space*. They can be derived directly from the symmetrical staves on page 11. Notice there that the accompanying tritone is on a space: These two groups of symmetrical staves exchange the positions of C and F# on the staff. Here the tritone is on a line. Thus they are 'sisters' or relatives and form the same tessellated pattern as a grand staff. Naturally, **b** is the best among these 'space' orientations.



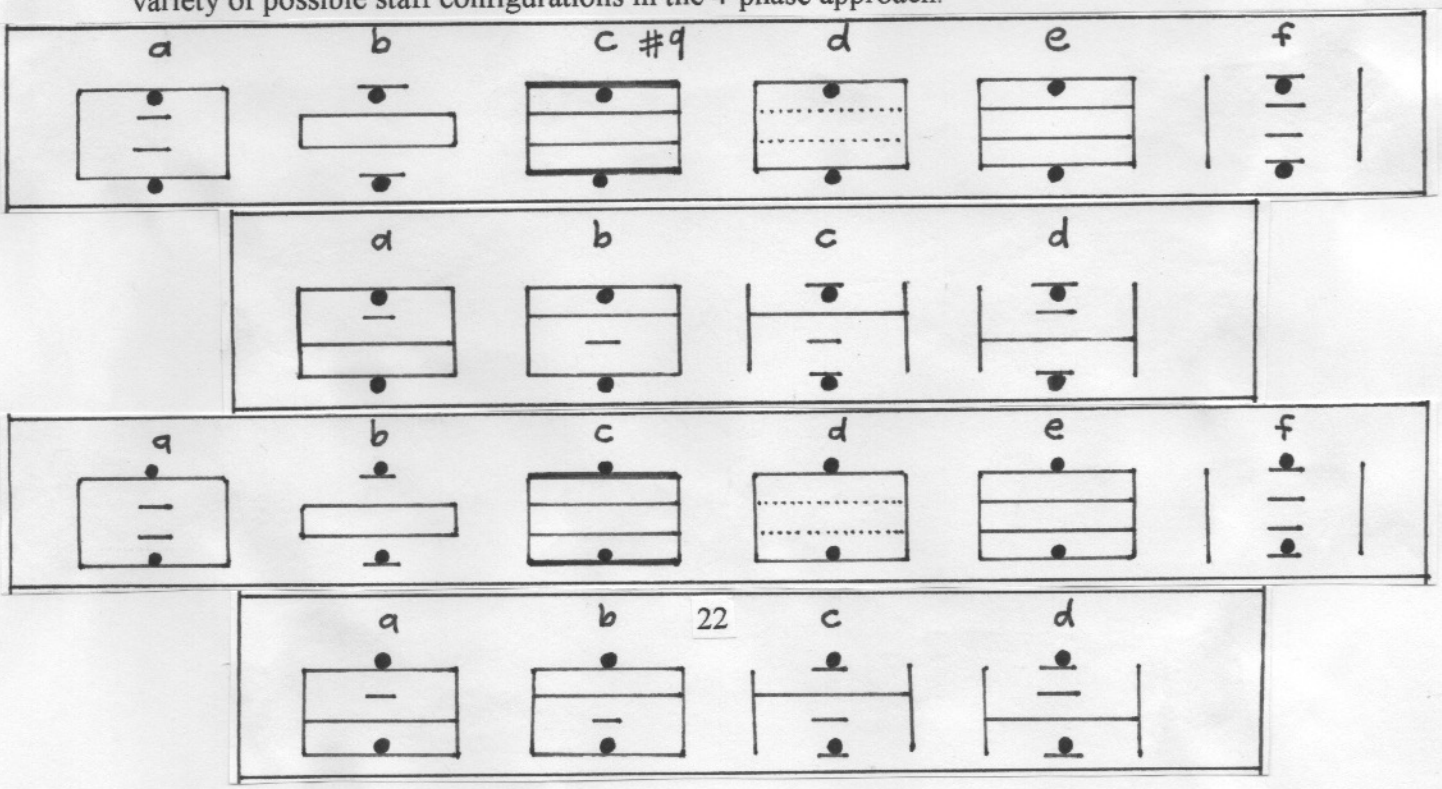
THE SET OF 4-PHASE ASYMMETRICAL STAVES, SPACE ORIENTATION

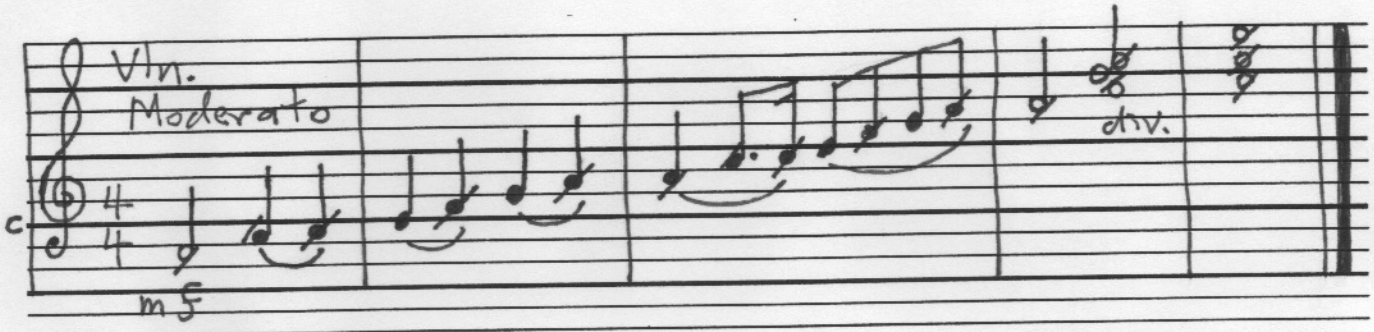
Asymmetrical staves are also amenable to such treatment, making a group of less desirable configurations.



4-PHASE ASYMMETRICAL STAVES, ORIENTATION 'TOUCHING'

When we move away from the 'space' orientation for the reference, and instead use the 'touching above' and 'touching below' framework, the staves are *all* asymmetrical. This 'most undesirable' group of staves is shown in the diagram below. First comes 'touching above' and then 'touching below.' Our notation #9 is essentially **c** of the 'touching above' camp. Such notations are not really suitable for 12-et which 'favors' a symmetrical approach. However, they have been presented here to demonstrate the variety of possible staff configurations in the 4-phase approach.





#10
Classification: 4-phase symmetrical

This notation, the last of the 4-phase notations in this survey, is interesting for the creative method of distinguishing the positions 'touching below,' space, and 'touching above' by using slash signs. Unfortunately (with my bad eyes) it is sometimes difficult to see whether the slash is 'right', 'center,' or 'left' on the note-head. The inventor used this technique to reduce the line spacing from 4mm. to 3mm., but I think (in the interests of legibility) that the 4mm. spacing should be restored. His reforms have resulted in an octave span of 9mm., close to the standard staff of 8mm., but the 12mm. staff would eliminate many of the 'cluster' patterns necessary in his spacing. Note that this notation could be used with a *twin-line* staff to make it more readable. Another disadvantage of this method results from the fact that nine of the twelve notes must have a slash of some kind. Only three notes are *without* slash signs. This situation cannot help but damage readability. I also have a problem with this use of a slash sign, since that very symbol has already long been used (since the 19th century) for notating comma-shifts in 53-et and just intonation. Hence this notation could not be easily applied to 53-et. Finally, there is another issue not considered in this survey. The technique of using a slash sign could also be applied to 3-phase staff configurations. In fact, it seems to be better suited to 3-phase notation than 4-phase, since less notes must have a slash sign (eight rather than nine) and only two orientations of the slash sign are needed. The slash 'through the middle' can be eliminated. In spite of these advantages, I don't think the slash sign addition is really needed in 3-phase notation.

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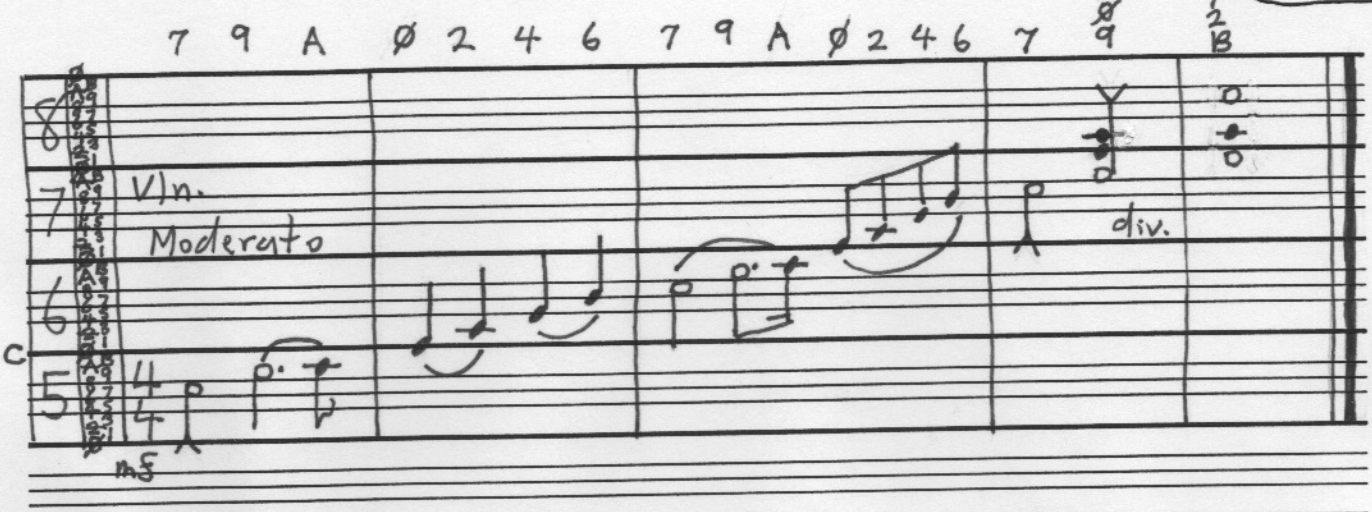
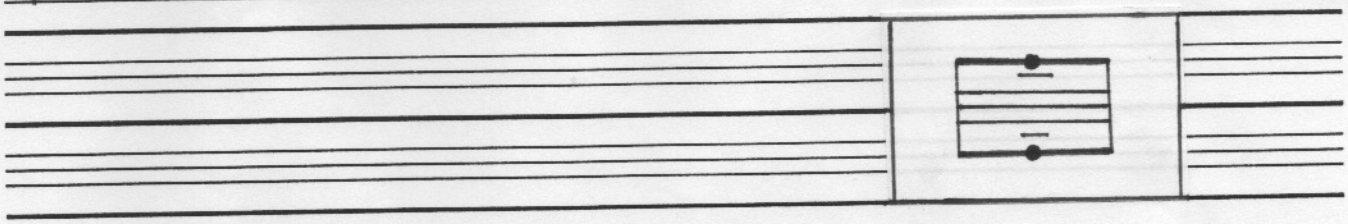


#11
Classification: 2-phase, symmetrical, line-orientation

This notation is the first of a large group of 2-phase approaches in this survey. I have tried to be faithful to the inventor's wishes, thus writing his numerical 'solfeggio' over the staff, although I'm not quite sure of its purpose. Also, I have used his improved half-note since it is easier to read than the double-stem half-note. In addition, for a change, I have written some of the stems upward and some downward, in order to demonstrate that this is an open possibility on a grand staff. This notation has been selected as one of my 'six best' because it provides an example of the many possible decent staff configurations that can be used in the 2-phase approach. In general, any staff configuration that is symmetrical and that clearly displays the symmetry between C (the reference pitch) and F# (its tritone) is usable in a chromatic notation. Many decent candidates fall within these parameters (as seen over the page in the diagram of 2-phase symmetrical staves). That being said, #11 is still decidedly inferior to the ergonomic *double twin-line* staff. Firstly, it requires a bold line when the *double twin-line* does not. Secondly, it requires two ledger lines instead of one. Most importantly, these two ledger lines are juxtaposed with the bold line between them. Consequently, there is too great a concentration of space in the notation. In the *double twin-line* the use of space is more appropriate, indeed, optimal. Thus this notation is somewhat 'unbalanced' toward the 'spacey' side. However, this characteristic was a welcome relief from most of the 2-phase notations presented, which are too 'liney.' Finally, the inventor joined the 6-6 bandwagon and thus made a retreat from universality. Yet it appears that his notation is not meant to be a 6-6 tablature, only to emphasize the distinction between lines and spaces on the staff. It is not clear to me why the time value notation must be altered for something that was already obvious.



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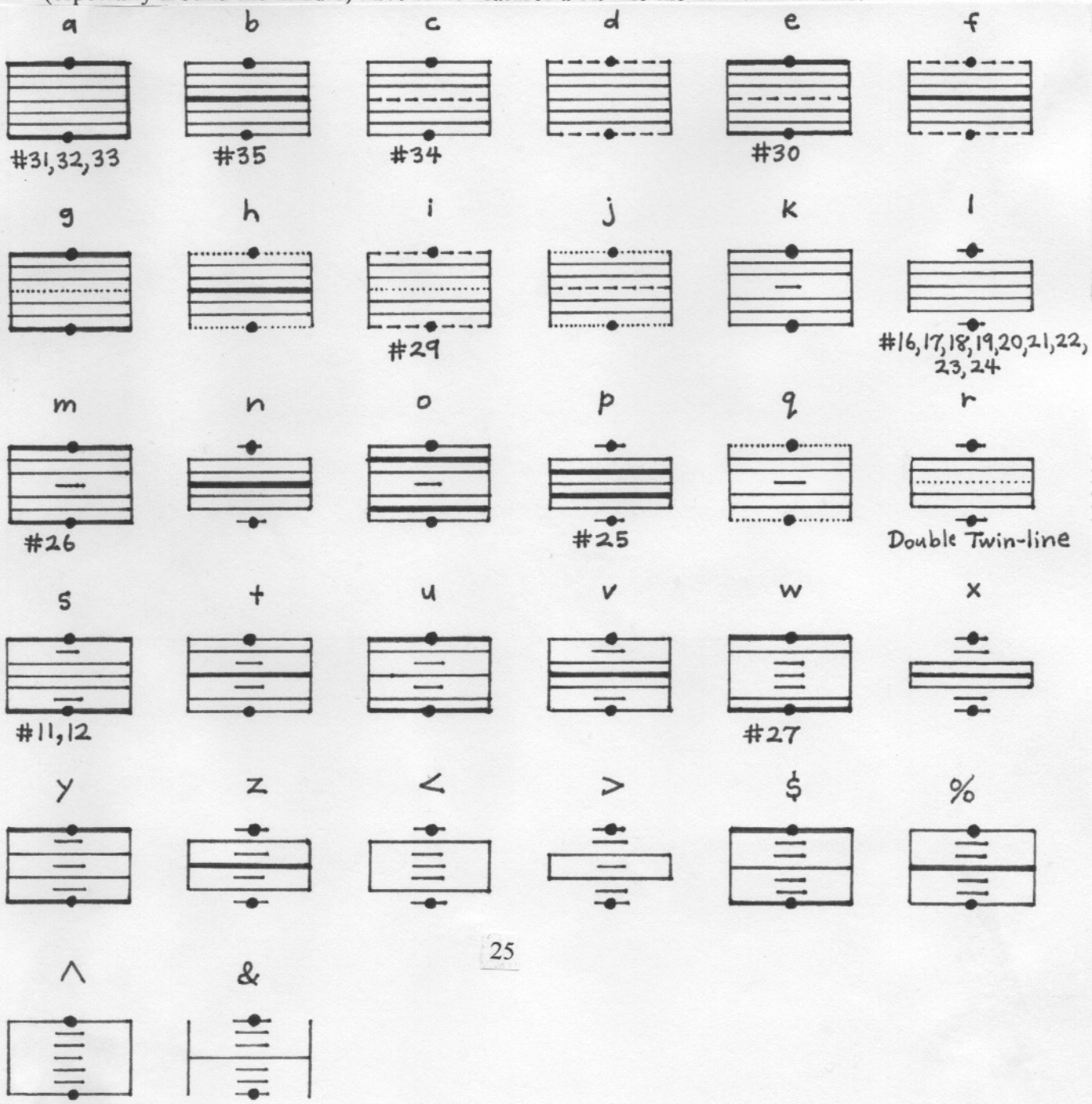
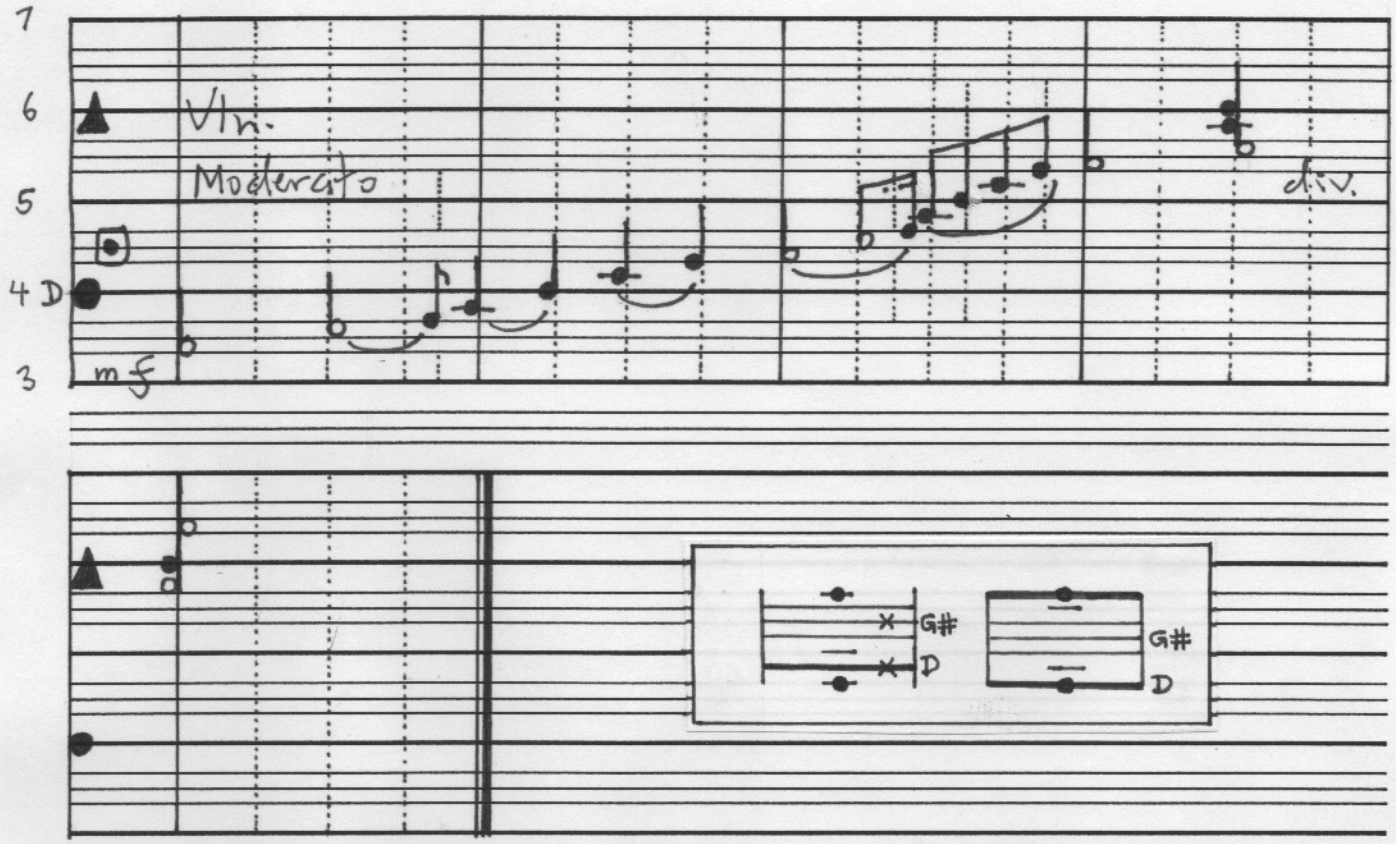
THE SET OF 2-PHASE SYMMETRICAL STAVES, LINE ORIENTATION

The examination of possible 3-phase and 4-phase staves has taught us much about what we value and don't value. It is clear that it is only *symmetrical* configurations that hold our interest. When it comes to 2-phase staves even more possibilities are apparent than there are in 3-phase and 2-phase approaches. Consequently, we will limit the number of staves by simply ignoring all of the asymmetrical possibilities. Asymmetrical staves that *do* appear in this survey (and there are a number of them) will be treated as only 'transpositions' of symmetrical staves. In this way we can avoid drawing an inventory of asymmetrical patterns. We are left with only two groups: symmetrical staves that have a *line orientation* and a *space orientation*. Below we see the set of line oriented staff configurations. They are arranged so that the extreme of 'too many lines' begins and 'too many spaces' ends. In the middle, between about **k** and **v** are 'decent' possibilities, which have one ledger line (the best) or two (slightly spacey). Also, they are arranged in pairs by tritone displacement—**a** goes with **b**, **c** goes with **d**, and so on. These pairs form identical patterns on a grand staff. Examples from the survey are numbered underneath the staff. Notice how very many notations followed **l** and how very 'patchy' the general representation is. The *double twin-line* forms the best single alternative in the whole set. Many of the staves require a bold line (a disadvantage). However, many of them (especially around the middle) have *some* features a bit like the *double twin-line*.





#12
Classification: 2-phase, asymmetrical, line orientation

This staff configuration is clearly identical to #11 except that it is oriented around D rather than C as the point of symmetry. (See the diagram ~~below~~). The inventor is probably making use of the D symmetry on 7-5 keyboards. The three lines then represent the three 'black' keys F#, G#, and Bb. The same criticism of the staff configuration given for #11 also applies here. Also, his sign for the key signature is vague, indicating only a sharp or a flat key rather than what it actually is. The proportional time value graph of primary bar-lines, secondary beat lines and beat subdivisions is an unnecessary clutter. The esoteric notation for tied notes was not clear to me in the supporting references. Why a single symbol for rests of all values? Apparently the inventor uses non-mensural beamings, but I do not understand how this practice makes the notation any easier to read—on the contrary, it promotes confusion. Like #11, this notation also imposes a 6-6 style arrangement of hollow and filled notes, necessitating time value reforms. Perhaps this decision led to his use of proportional time value spacings. At any rate this effort is not so successful as #11.

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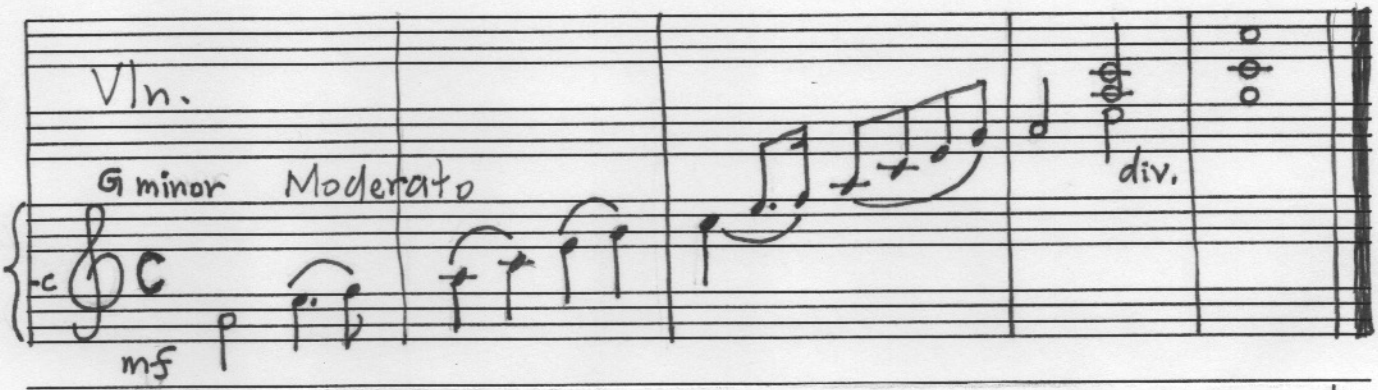
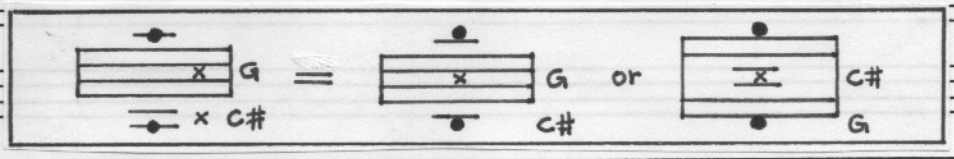


#13
Classification: 2-phase, asymmetrical, space orientation

This chromatic notation is the first of a sub-group of four (#13, #14, #15, and #28) that share a common staff pattern, although the orientation varies amongst them. #13 is centered on C# (and its tritone G), #14 on Eb (and A), while #15 and #28 center on D (and G#). All four of them are subject to a common criticism based on the ergonomics of the particular 'space oriented' staff configuration. These comments are found over the page in a short discussion concerning 2-phase space orientation. Reactions here concern specifically #13.This notation deserves kudos for preserving traditional time value symbols. Moreover, the inventor has been considerate enough to state the key signature explicitly—something not done by the others so far. However, many of his reforms seem esoteric or even absurd. In the latter category is the impractical idea of printing the ledger line for C *in red* for 'easy reference.' Such a practice is quite useless. If any component were to be printed in red for reference, it should be a solid line and *not* a ledger line. Also, it appears that he conceives his staff not as continuous but as an 8-line (4+4) discontinuous staff—hardly a good move. In the esoteric category is the practice of replacing the octave indicator by an inverted G-clef sign. It is also rather pointless to use reversed and upside-down flat signs for quarter-tone shifts. This practice has indeed been followed by many modern composers (along with the corresponding alterations of sharp signs), but this notation has relevance only for the *standard staff* format. In a proportional chromatic notation these signs are needlessly complex or 'esoteric.' A simple plus and minus sign would do just as well and be easier to write and read. The altered flat signs only promote confusion. Finally, why should traditional rest symbols *always* be placed between the two staff segments? Put them wherever they are appropriate.



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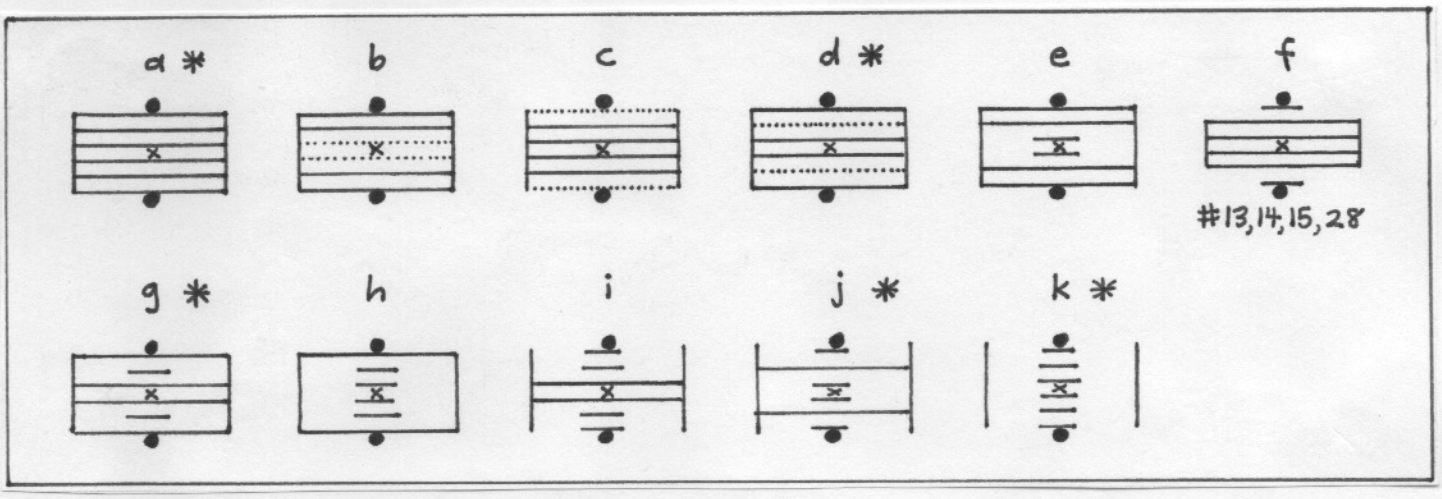
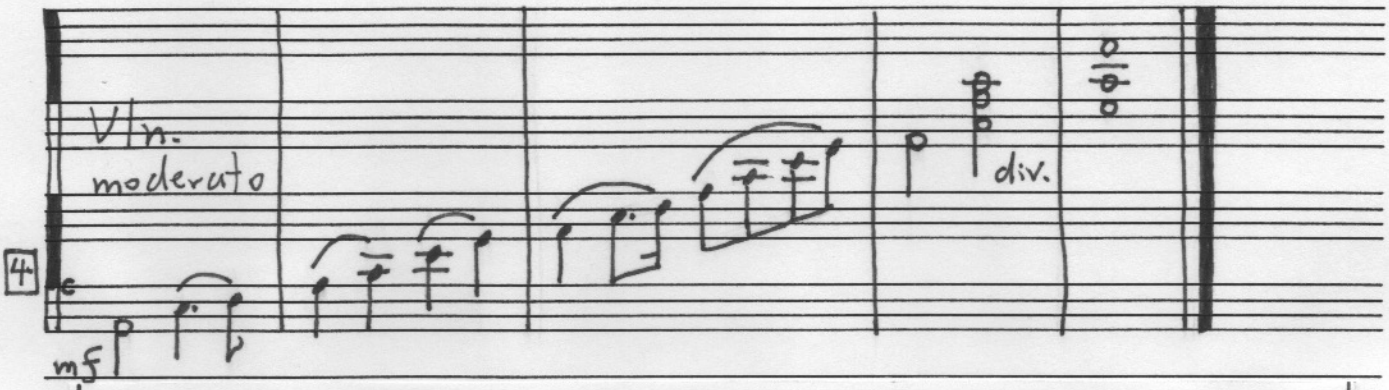
THE SET OF 2-PHASE SYMMETRICAL STAVES, SPACE ORIENTATION

#13 is a member of a small group of staff configurations that put the reference pitch on a space rather than a line. In terms of readability and pattern ergonomics, this decision is unfortunate. An examination of the symmetrical space-oriented patterns given below quickly reveals that they have special properties deleterious to ease of readability. Specifically, many of them make the same pattern when paired with their tritone partners. This peculiar property is indicated by an asterisk on the diagram. Such a property damages the ability to gauge 'where you are' in the scale on the grand staff. In other words, it is overly abstract. That being said, the pattern used by #13, #14, #15, and #28 is probably the best of this sorry lot, although it's not saying much. Specifically, this pattern (**f** and its tritone-shifted sister **e**) manages to deteriorate the optimum ergonomics of the *double twin-line* in this manner: By using two juxtaposed ledger lines (instead of one) it creates too much concentration of space in the layout. At the same time it needs four lines, thus unnecessarily creating too great a concentration of lines. The reader needs to 'find one's path' amongst four *undifferentiated* lines (rather than the optimal *double twin-line* solution where it is only two lines between the ledger line and the dotted line). Thus this pattern manages to combine the worst of both worlds—too many lines *and* too many spaces! The other examples of space orientation shown below are also quite flawed. The diagrams have been arranged (as usual) so that they begin with 'maximum lines' and end with 'maximum spaces.' Needless to say, none of these patterns are recommended as staff configurations.





#14
Classification: 2-phase, asymmetrical, space orientation

This notation is subject to the same criticism of its staff configuration as that outlined on the previous page. The difference with #13 is a matter of its reference orientation, Eb-A rather than the somewhat unusual C#-G. The pitch A then centers a rather 'too liney' region of the scale, while the Eb centers a rather 'too spacey' region. It appears that the choice of A was possibly somewhat ambivalent to him, since he still uses C as a marker of octave designation, and he uses numbers to name the notes: C=1, A=10, etc. The inventor has justified his choice of A at the center of his 'lines' thus: "only with the keyboard instruments is C an important referential point. Other instruments are much more concentrated around the note A" (MNMA News, 4th quarter, 1996, p.3). But this statement is patently untrue! Yes, guitars are oriented around A, but strings around D and G, woodwinds around C and F, brass around F, Bb, and Eb—the pitch A doesn't possess any great 'attributes' as a reference in competition with others. As far as I can surmise, only two reasons (both historical) can be countenanced for choosing A as a reference: firstly, it was the center of the medieval European monochord, and secondly, some 19th century committee of musicologists chose A as their *frequency* reference point—A = 440 htz. Neither of these reasons holds a candle to the practical structural priority of choosing D for meantone-related systems (such as 12-et). Moreover, the candidate C also 'has its charms.' It sits at the meeting place of all the human vocal ranges—it isn't arbitrary that we put the 'middle' in 'middle C.' Most music cultures (both ancient and modern) have recognized some form of this center. For example, the Indian SA is generally or traditionally pitched variably between Cb and C#. The specific frequency numbers of our modern C *are* somewhat arbitrary—a consequence of using A=440 as reference, but C still has (at least) a psycho-acoustical 'edge' that should be appreciated. In addition, the most consonant of the diatonic scales is that on C (using only the 'white keys' of the keyboard). On the whole, C (and D) undoubtedly have a much stronger case than A. The inventor (in his book) also gave an alternative pattern to this staff (called his 'chromatic notation B'). The staff for his alternative notation 'A' is identical to #12. One could argue that his 'A' is *better* than his 'B' since it at least has the advantage of D symmetry and it is easier to read. One must 'find one's way' around only three lines instead of four. This whole group (#13, #14, #15, and #28) do not rank very highly in ergonomic value.

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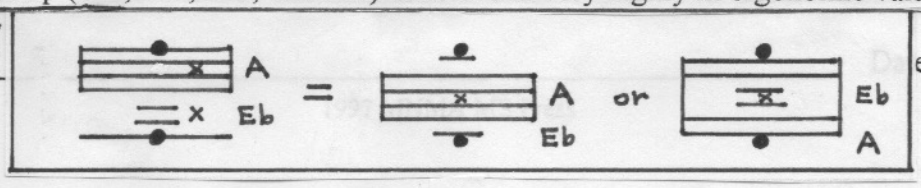
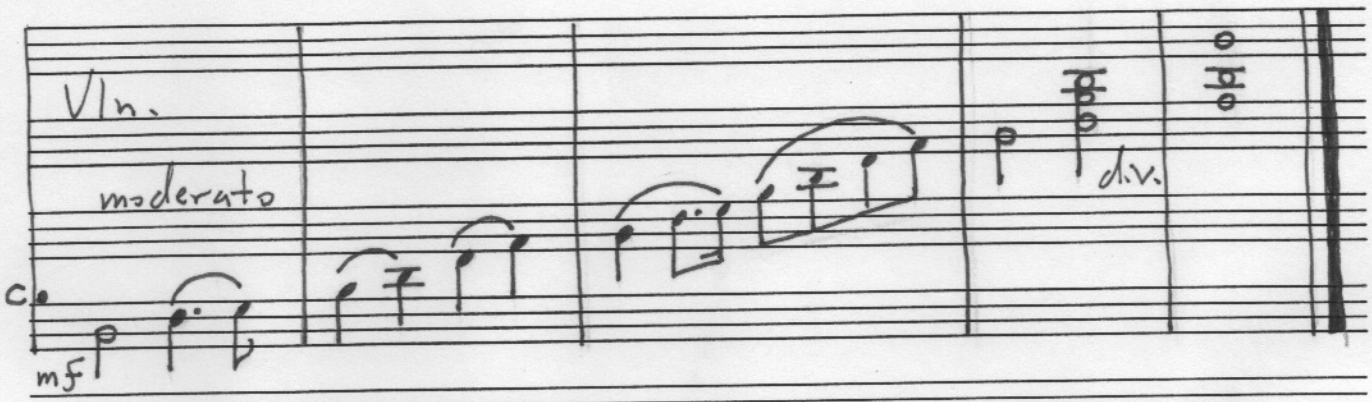
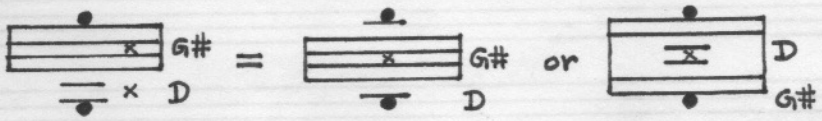




#15
Classification: 2-phase, asymmetrical, space orientation

#15 (and #28) rank a bit better than #13 and #14 simply because they at least have the advantage of D symmetry. However, they still suffer from the unfortunate layout of their lines and spaces. This inventor's other contribution, #36, is much more interesting.



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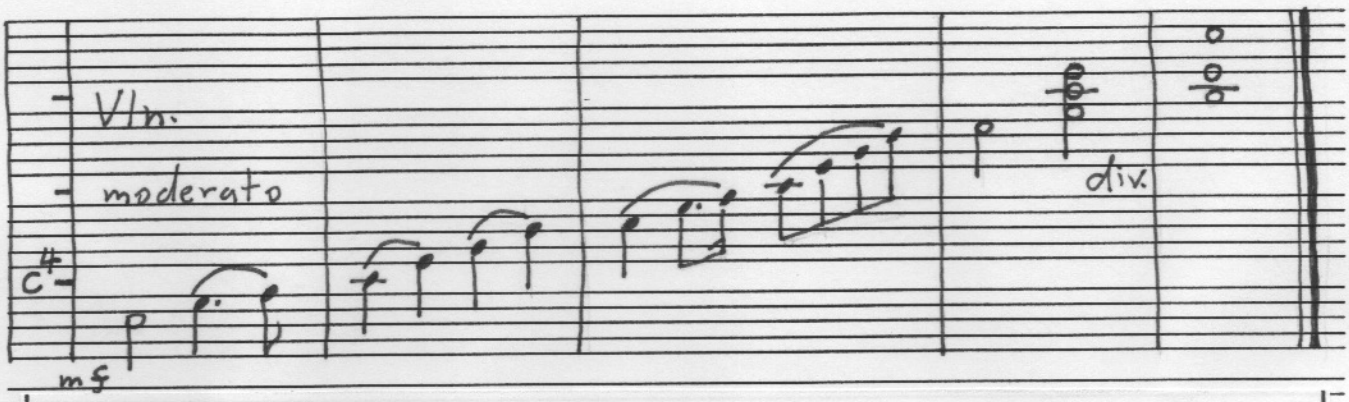
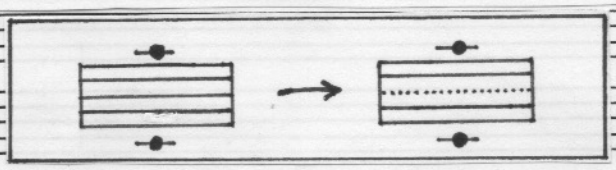


#16
Classification: 2-phase, symmetrical, line orientation

#16 is the first of a large sub-group of notations that use one particular staff configuration (designated **I** in the set shown on page 25). As is, this pattern has too many undifferentiated lines. Yet it has been chosen for the august company of the 'six best' (representing the entire sub-group from #16 to #24) because it is tantalizingly close to the optimal *double twin-line* configuration. Compare the notation above with the *double twin-line* shown below. A simple change of the solid F# line to a 'recessive' dotted line improves the readability by a lot. The optimal version allows the pitches F and G (surrounding the dotted line) to be well 'accented' in relation to the reference C. The layout of the whole 'regionality' of the scale is consequently much clearer—it is considerably easier to read and write. In fact, the balance between lines and spaces is now as good as it possibly can be. Meanwhile, #16 (and all of its 'clones' in this survey) are definitely 'unbalanced' toward the pole of 'too many lines.' It becomes more difficult at a glance to know which 'neighborhood' one is occupying. Yet this five line staff is not *really* bad (like #31). The *double twin-line* could be considered a fortunate variant of #16.



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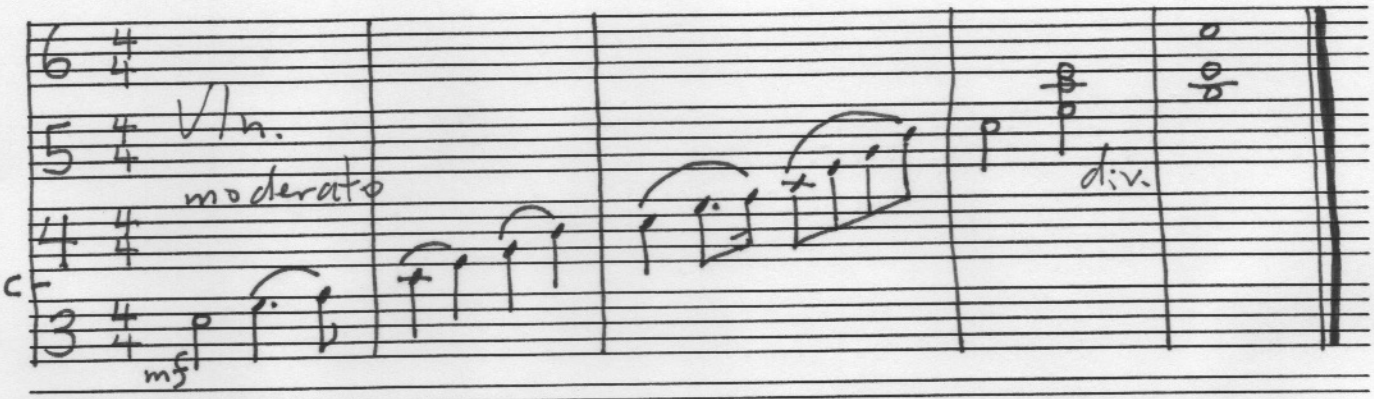
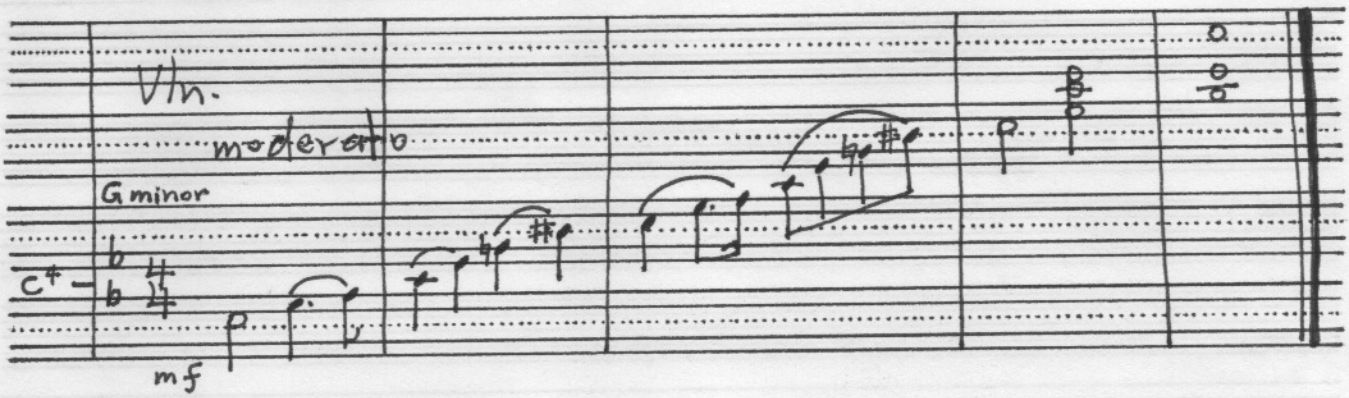


#17
See remarks on #16.

Below I have notated the melody on the *double twin-line* staff but intended for 19-et instead of 12-et. The process involves simply re-introducing the accidental signs in order to make intentions clear. Again, the natural sign on E is not strictly necessary, but I have notated it anyway. The two flats in the key signature (G minor) reflects the fact that the scale in 19-et requires an Eb and Bb. No comma-shift signs are necessary (like in 53-et). This scale is identical to the notation shown over the page and intended for 31-et.

19-et



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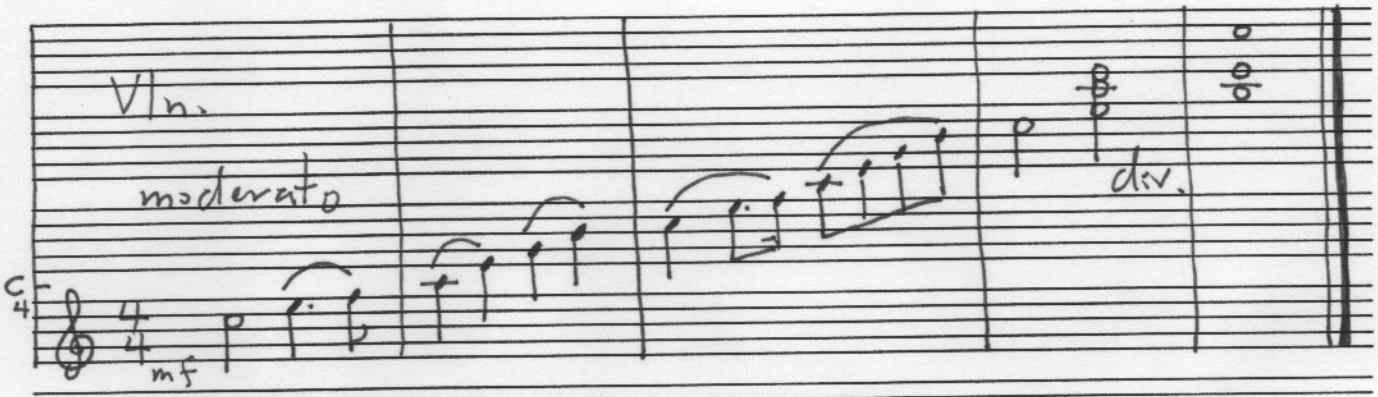
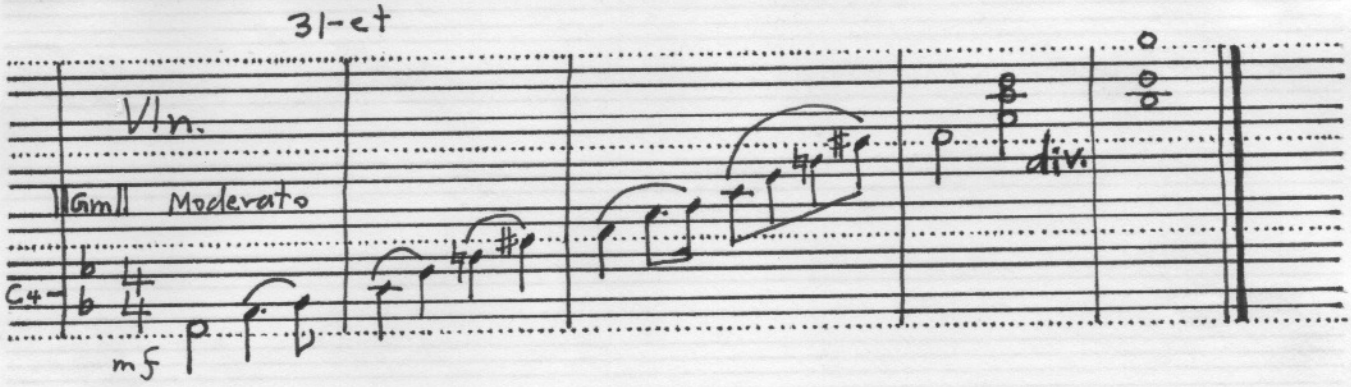


#18
See remarks on #16.

Below I have notated the melody on the *double twin-line* but intended for 31-et or extended (quarter-comma) meantone tuning. It forms a pair with the notation for 19-et on the former page. The notation is the same for both systems—the notations between them differ only when we have gone 'very far' around the circle of fifths. Both 19-et and 31-et have structural advantages in possessing only *one* circle of fifths (also like 12-et). Not all systems are so lucky. 24-et (quarter-tone), for example, has *two* disconnected circles of 12 fifths each. Hence it lacks modulatory integration. In addition, it is also highly inferior to 31-et in the quality of the temperament (the overall levels of harmoniousness, using the harmonic series or 'pure tuning' as the reference). The main purpose for demonstrating the melody in 19-et and 31-et is to show that proportional staff configurations can also be used for microtonal music.



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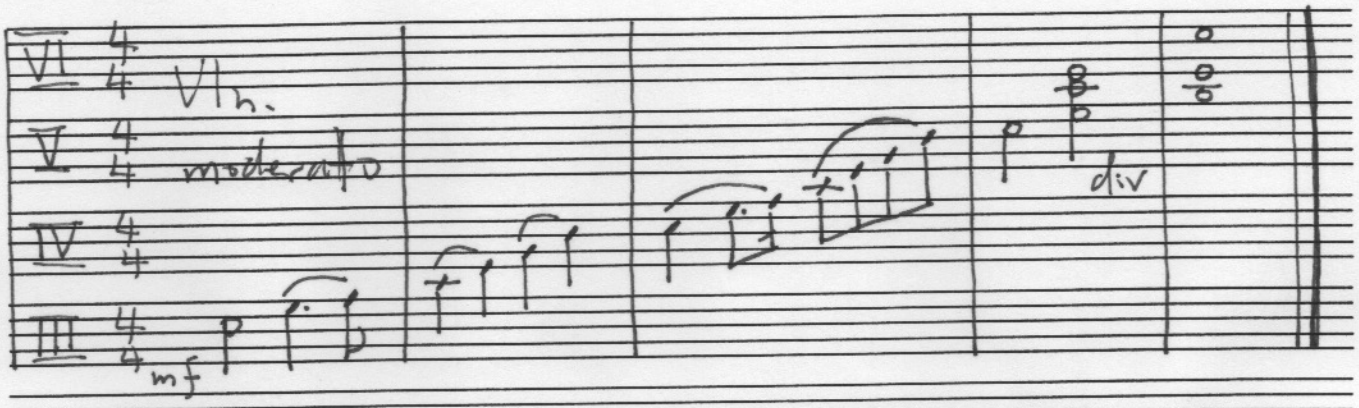
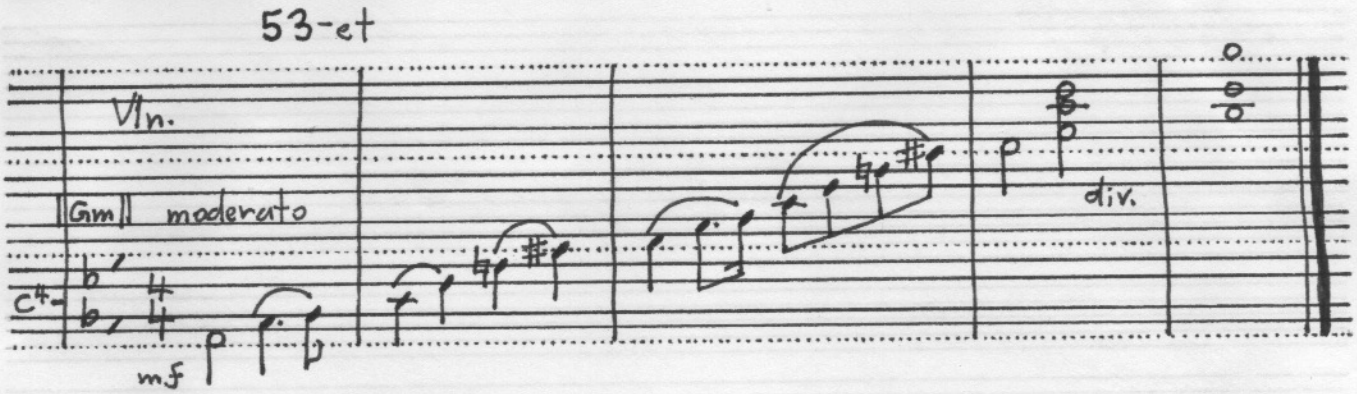


#19
See remarks on #16.

Below we see the melody notated on *double twin-line* but intended for 53-et. It is essentially identical to the notation on *twin-line* shown on page 11. Such a 53-et notation with its characteristic 'slash' signs for comma alteration could also be applied to the other optimal proportional staff—the *tri-line* configuration. In the rather complex (unfortunate but necessary) notation of 53-et and traditional 5-Limit Just Intonation, pitches that are natural, sharp, or flat can also be altered by 'comma-raised' and 'comma-lowered' signs. These difficulties come with the territory.



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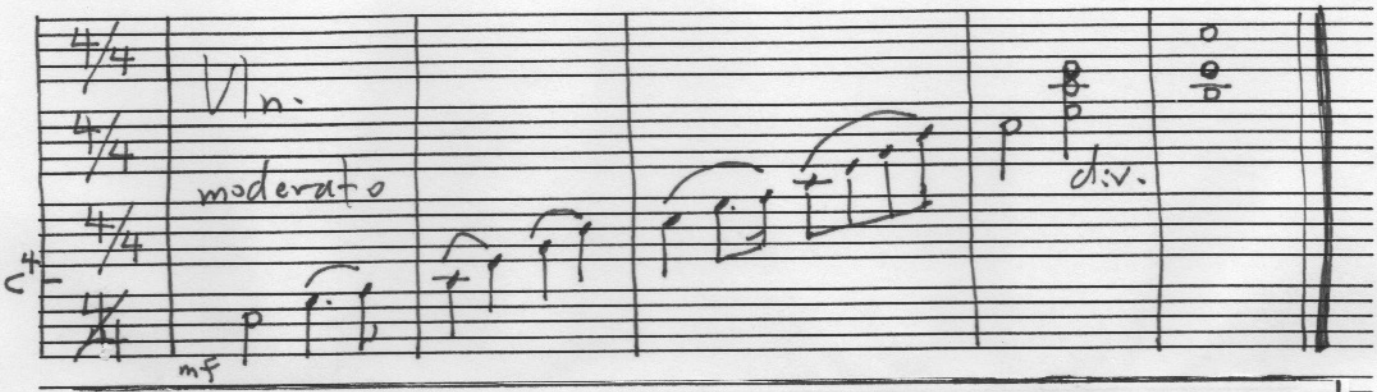
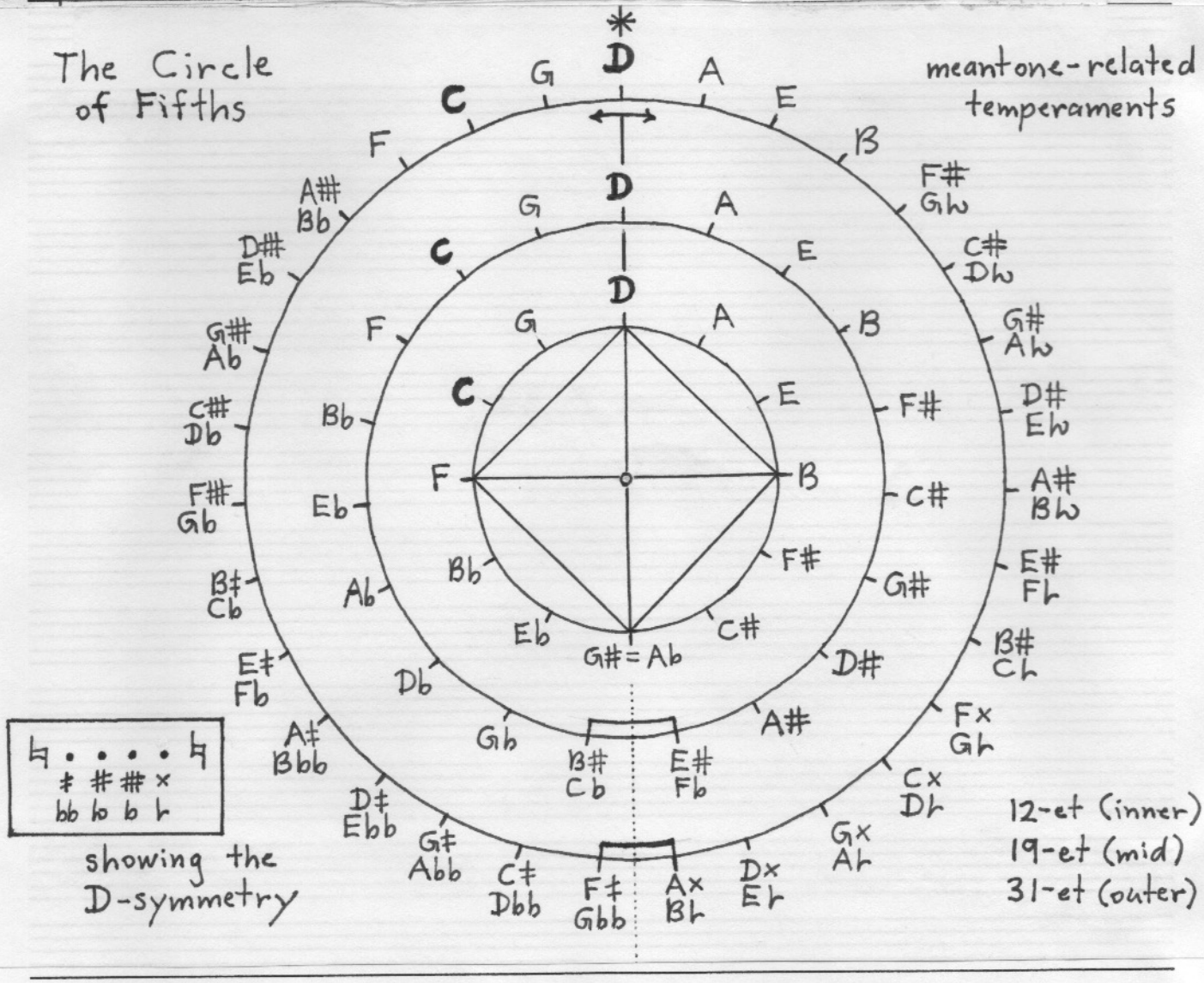


#20
See remarks on #16.



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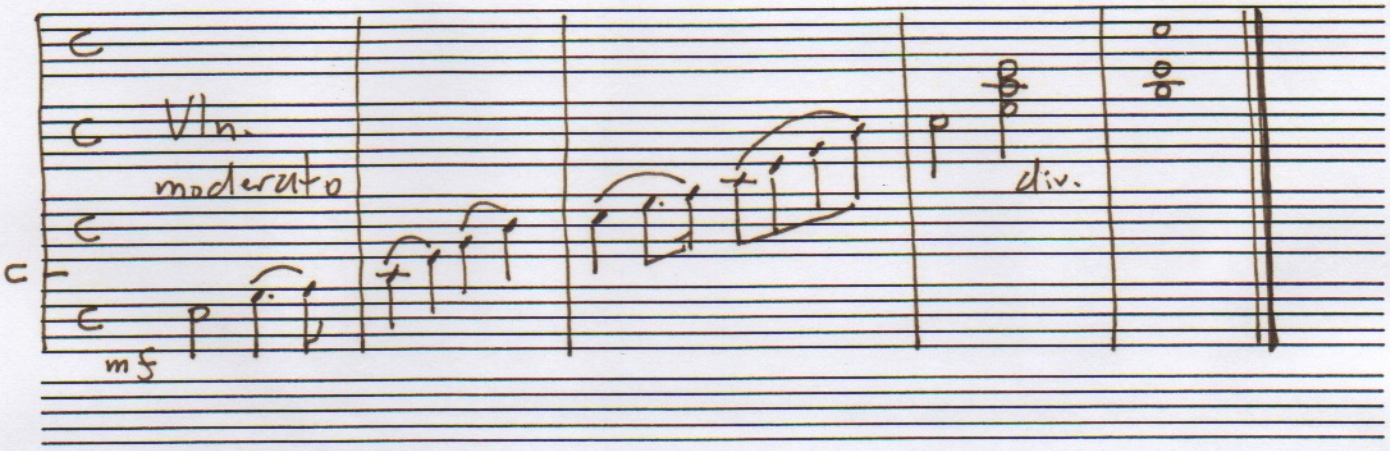


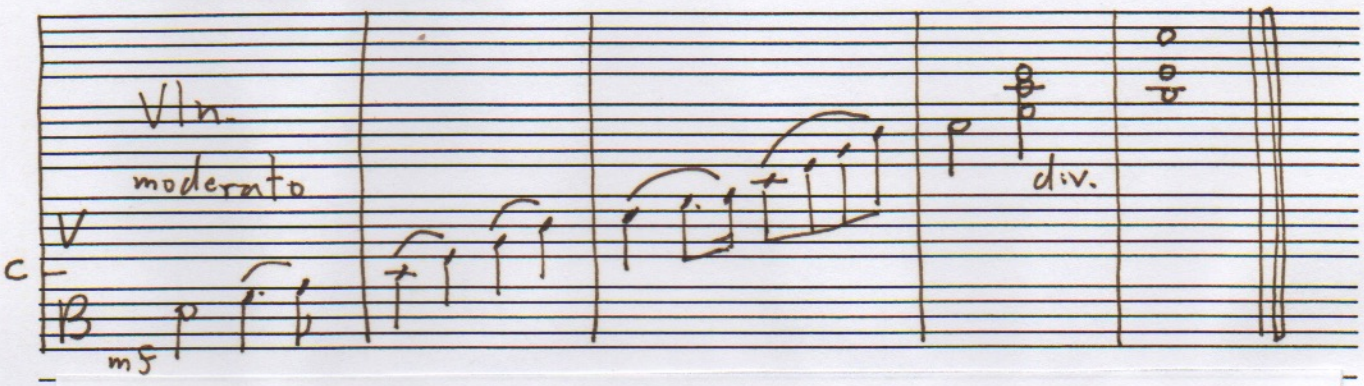
#21
See remarks on #16.

CLASSICAL GUITAR REFRETTED FOR 31-ET

A color-code has been applied to the frets for orientation. Without it one gets lost in the 'jungle.' On the other hand, with a decent color-code the instrument is only slightly more difficult than an ordinary 12-et guitar, reflecting the fact that there are more places to put your fingers. Finding the optimal color-code was a little like finding an optimal staff configuration. It is based on two principles: first, juxtaposed frets should have maximum color *contrast* for easy sighting. Second, frets that are statistically most used are to be emphasized by dark and/or bright colors, while those that are least used are given pale colors or white. Roughly half the frets are white so that colors are 'surrounded' by white. This 'continuum' between 'most used' and 'least used' can be gauged from the circle of fifths. Instead of colors, shades of gray between the extremes of black and white are also possible in this rubric. This guitar allows not only unusually 'sweet' harmonies, but also enharmonic shifts and open modulation into thirty-one keys (extended meantone).

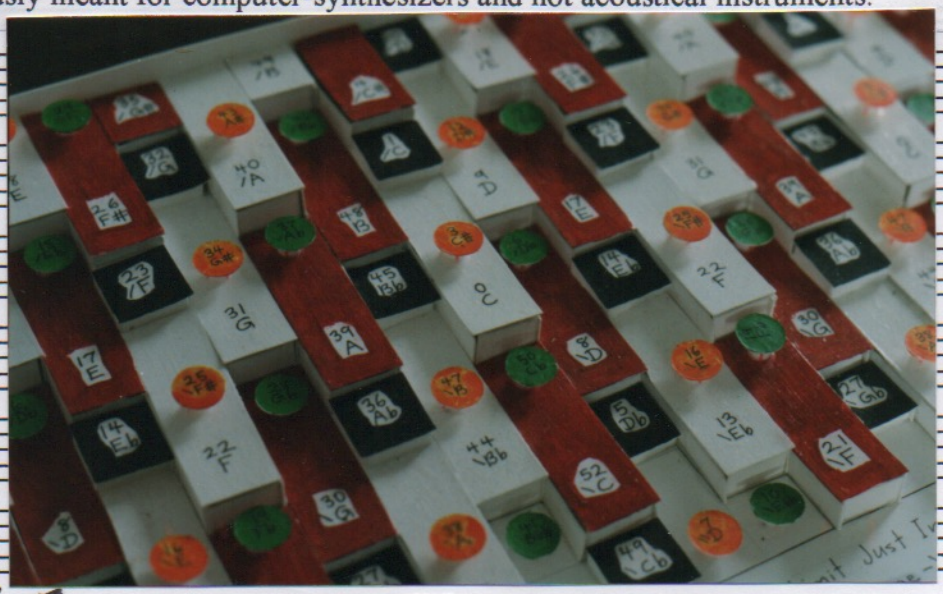
Evaluator: S.T. 36 Date:

#22
See remarks on #16.



AN EXPERIMENTAL KEYBOARD LAYOUT FOR 53-ET

This planimetric keyboard is my own extension of the design principles of Colin Brown (1860). He made one of the first efforts to invent a comfortable keyboard that conforms to the complex architecture of Just Intonation. He was (of course) influenced by the then contemporary acoustical research of Helmholtz. The instrument was intended to be a harmonium (reed organ). In spite of its age it is still a good design and nice to finger, since comfortable fingerings give natural chords. This effort inspired R. H. M. Bosanquet (1870) to invent his (much more famous) *generalized keyboard*. Bosanquet intended it for 53-et, but, ironically, its layout is flawed for 53-et—yet it suits *perfectly* the architecture of meantone-related temperaments (12-et, 19-et, 31-et…). The pattern layout is a little like a 6-6 keyboard but vastly superior in its fingering ergonomics and its capabilities. Yet no one has applied it to 12-et because they assume that it 'belongs' to 53-et. Most modern efforts to find a good generalized keyboard are heavily influenced by Bosanquet. An ergonomic design for 53-et is much more difficult to achieve than one for meantone-related temperaments. For various reasons, one overall design that covers all possibilities is probably not possible. Good planimetric keyboard layouts for 53-et have recently surfaced through Hanson (1950) and myself (1989). Such keyboards are obviously meant for computer-synthesizers and not acoustical instruments.



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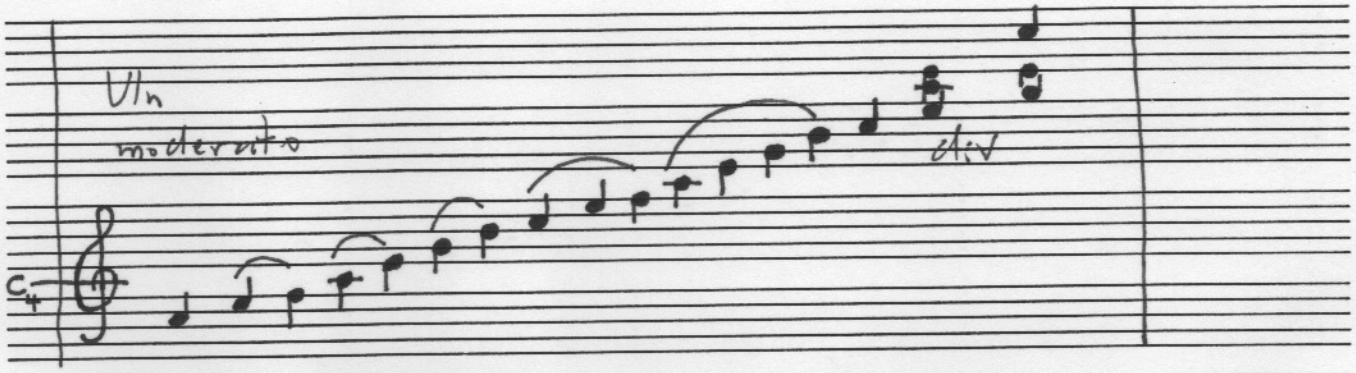

#24
Classification: 2-phase, symmetrical, line orientation

For remarks on the staff configuration, see #16. I refuse to consider this notation as a serious proposal. The inventor has given *no* indication of time values. His 'insight' consists of placing short upward stems on the solid note-heads of one wholetone scale and downward stems on the other wholetone scale. Apparently, like many others, his notational reform was inspired (led astray) by a 6-6 keyboard. Here *all* the note-heads are solid, and the stems are too short to bear flags or beams. What good is a notation that does not have symbols for time duration?

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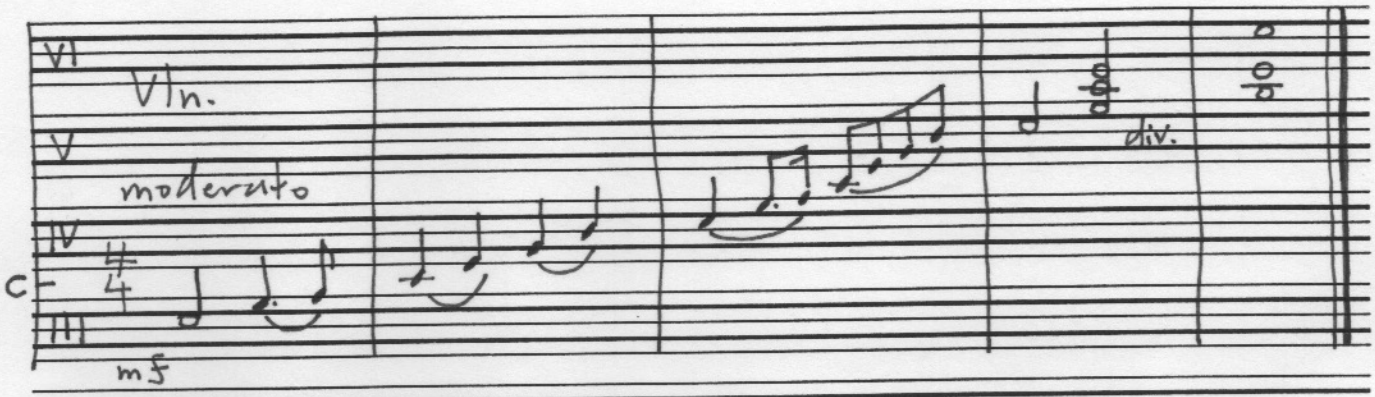
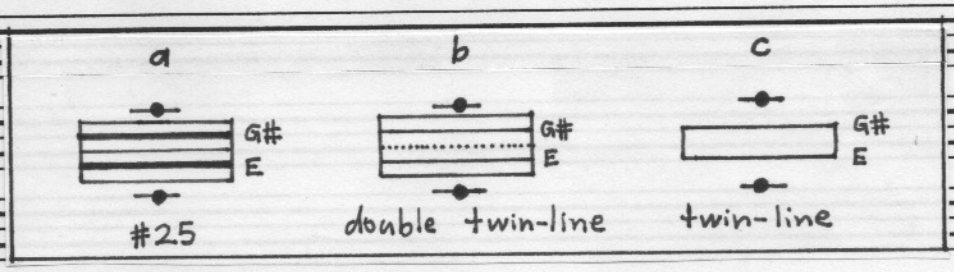


#25
Classification: 2-phase, symmetrical, line orientation

This notation, called by its inventor the 'C-Symmetrical Semitone Notation' emphasizes the 3-based symmetry of 12-et, by highlighting pitches C (ledger line), E and G# (bold lines). It is pattern **p** on page 25. This configuration is another decent layout of the 2-phase scale, but decidedly inferior to the *double twin-line*. Undoubtedly, the aim is the same—to emphasize the 'zone' around F# in the scale. But it does this by using the quirky device of employing *two* bold lines, when a single dotted line would suffice. Compare **a** (below) to **b** (the *double twin-line*) and also to **c** (the 4-phase *twin-line*). This notation is related in a peculiar way to the *twin-line* (just add some lines). Both of them put much emphasis upon 3-based (augmented) symmetry. In the case of the 4-phase *twin-line*, there is no choice in the matter; but in #25 we have a choice and I'm afraid that he has emphasized the augmented symmetry *too much*.



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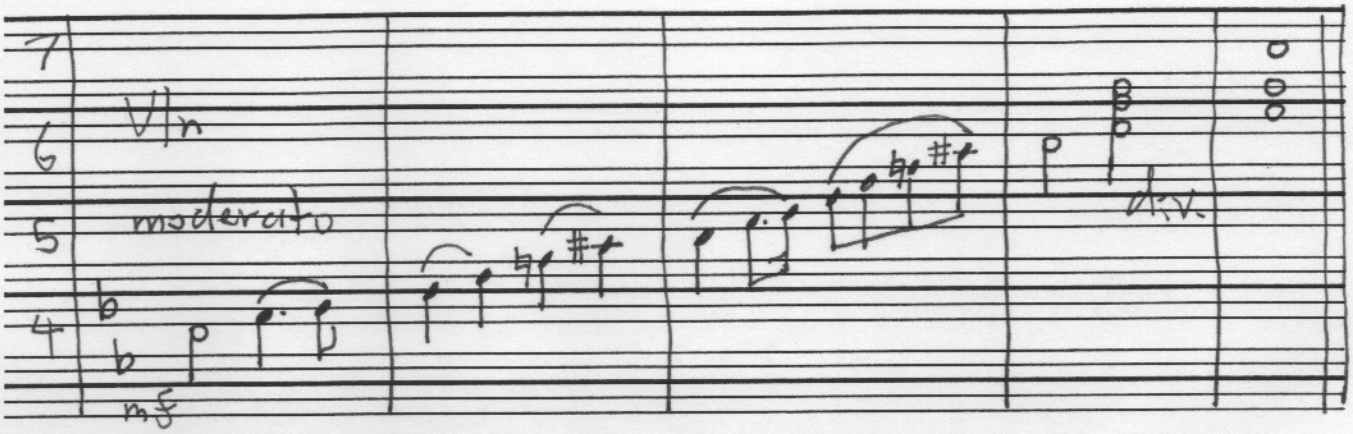
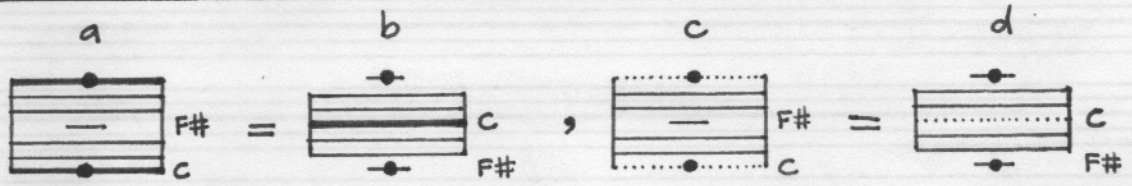


#26
Classification: 2-phase, symmetrical, line orientation

#26 is another close variant of the *double twin-line* configuration, as shown in the diagram below. **a** and **b** represent #26 (pattern **m** in the set given on page 25). If the bold line on C is replaced by a dotted line, as shown on **c** and **d** below, then we have the 'sister' by tritone relation of the *double twin-line* configuration (pattern **q** in the set on page 25). Thus we witness here another decent configuration. However, the dotted line is still preferable to the bold line because it is easier to spot. This inventor appears to be eminently sensible in his approach, since he allows the option of including accidentals, even though they are not strictly necessary. He has conceded that they do make the *intentions* of the composer more clear. This statement is so true and so much ignored by most of the notations in this survey. Given the inventor's 'permission,' I have put Bb and Eb at the beginning as a sign that the key signature *is* G minor. Also, I have included the accidentals in the melody in order to show plainly that the scale has deviated from the norm indicated by the key signature. This notation also has the advantage of being *directly* readable for 19-et and 31-et as well as the usual 12-et.



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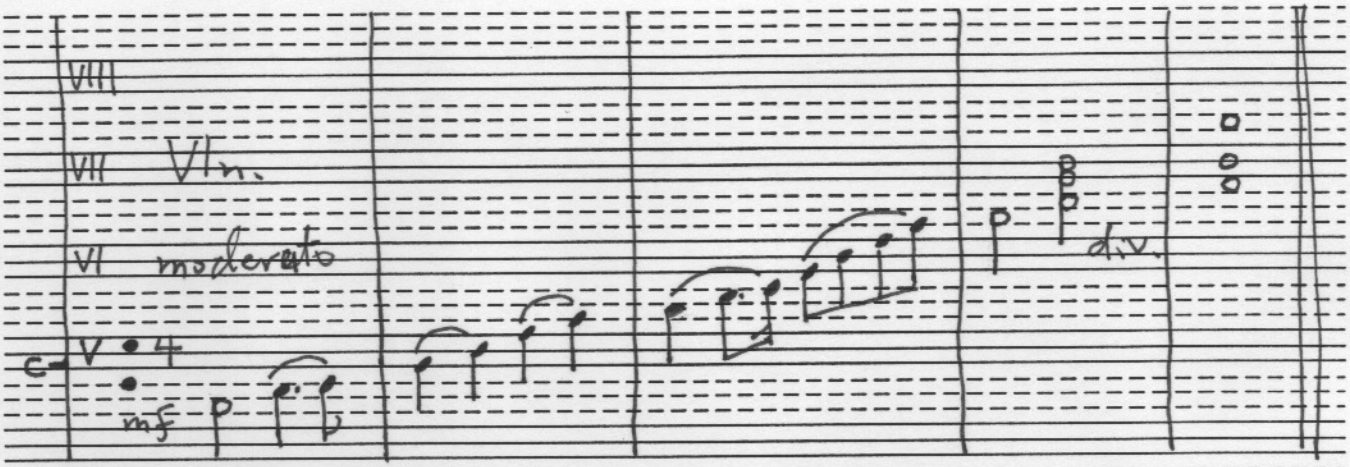
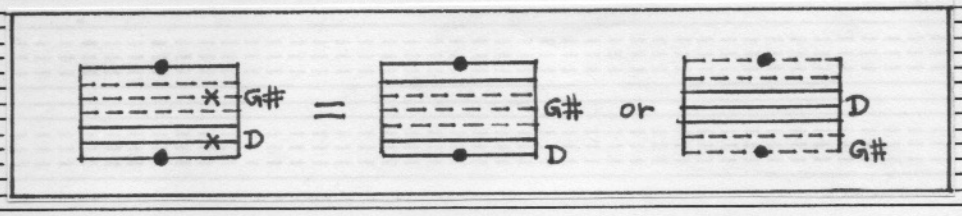


#27
Classification: 2-phase, asymmetrical, line orientation

This one is particularly poor in its staff configuration. Apparently the inventor arbitrarily chose three solid lines and three broken lines, resulting in a staff with a region (centered on D) of too many lines, and a region (centered on G#) of too many spaces. The great advantage of using a ledger line to delineate octaves is totally ignored. As shown on the diagram below, the notation is actually focused around D-G# instead of C-F#. Hence it is a member of the group of notations that make use of the D-symmetry of 12-et. Also on the positive side, he has allowed a key signature (although it isn't strictly necessary for 12-et) and also a time signature. In spite of these concessions to clarity, the notation is quite difficult to read due to its quirky staff configuration (which is essentially like pattern **w** in the set on page 25).



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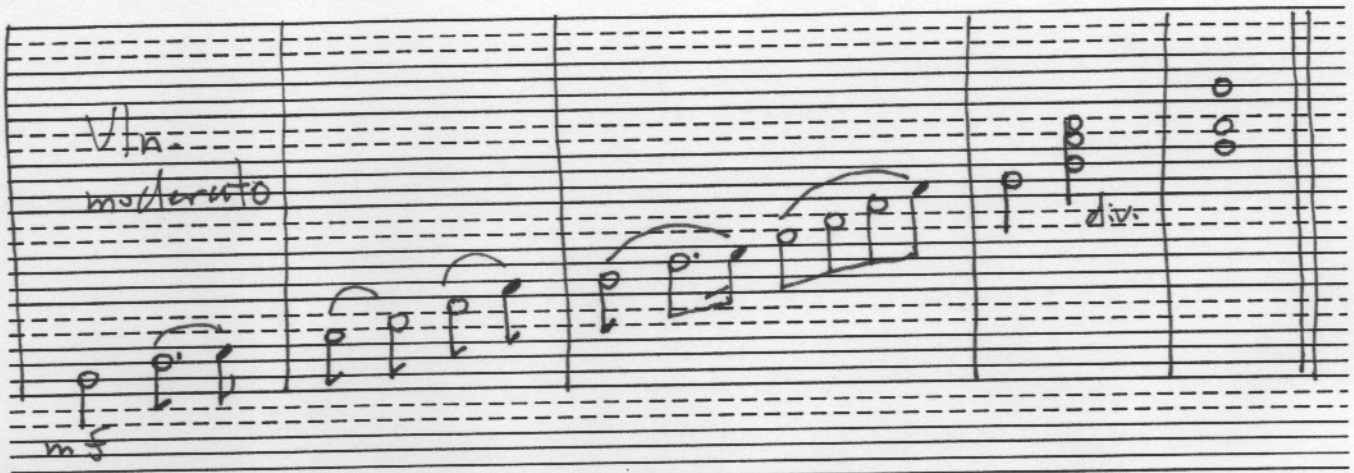

#28
Classification: 2-phase, asymmetrical, space orientation

This notation belongs to the small sub-group of 2-phase notations that use a particular staff configuration criticized on page 28. The only difference here is that the ledger lines have been replaced by broken lines (a small improvement). However, the staff still has too many lines *and* too many spaces. Like, #15, it is oriented around D and G#, as shown on the diagram below. This notation is quite 7-5 keyboard specific, since the inventor has succumbed to the fatal attraction of specifying that the five 'black' keys *must* have filled-in notes and the seven 'white' keys open notes. Consequently, he must alter the time value symbols in a confusing way (some half-notes look like quarter-notes, quarter-notes have flags, etc.). Hence this notation is another attempt to convert a universal notation into a keyboard tablature.

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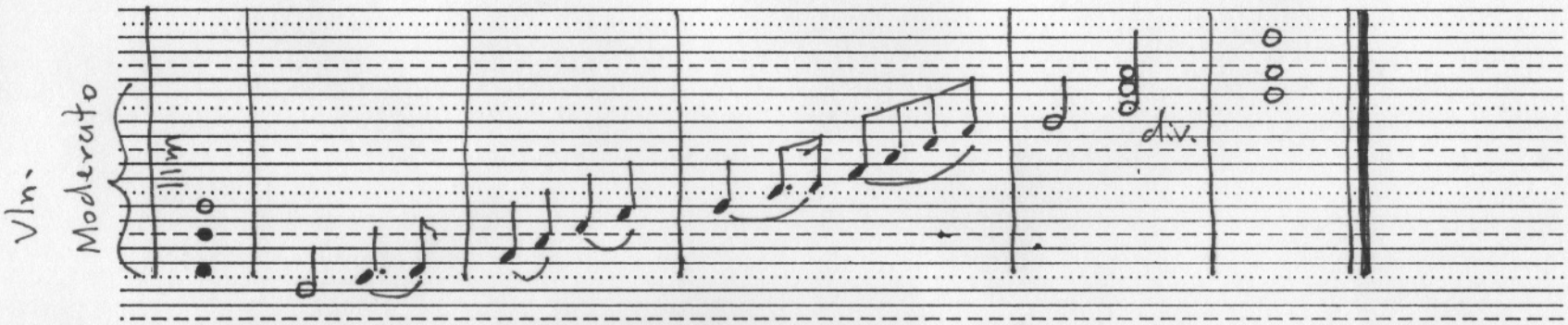
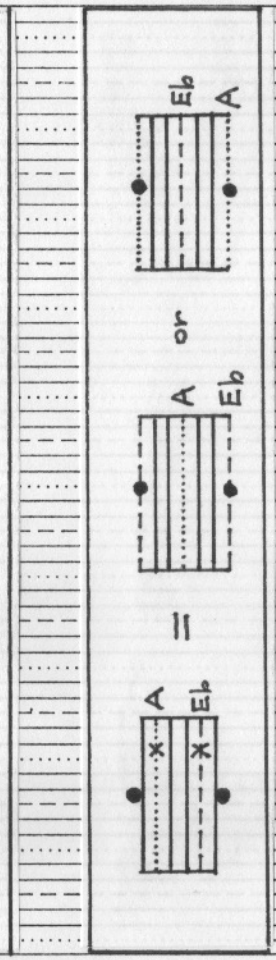
Page: #29 Carcelle, Henri: *Proportional Chromatic Musical Notation* 8c (LP29C)



#29

Classification: 2-phase, asymmetrical, space orientation.

This notation is the second reform surveyed that uses a vertical staff, (along with #9). Again, it is essentially an effort to create a tablature for 6-6 keyboards and then 'pretend' that it is suitable as a universal notation. Many pianists exhibit an 'imperialist' attitude, assuming that what is expedient for the piano must be good for everyone else. Because their instrument is *incapable* of producing an enharmonic, they want to deny them (in the notation) to everyone else. This *reductionist* approach promotes the 'lowest common denominator' in cultural standards. It aims to force the rest of us to restrict ourselves to the relatively crude temperament system of the piano. The preservation of flats and sharps in the notation at least allows the *possibility* that strings, winds, brass, voices (indeed, almost everyone) still have some reasonable directions for the implementation of color in the harmony. These chromatic notations aim to eliminate (or deny) color altogether. While such moves *are* expedient for pianos (and guitars), much is lost in the process. This particular staff configuration is a bit unusual in that the discontinuous version of the staff covers a span wider than an octave. But it is essentially pattern **i** on page 25. I find the pattern itself quite interesting, since it is identical to the *double twin-line*, only the ledger line has been replaced by a continuous broken line. This is an unfortunate move, since more lines are involved and the octave differentiation is not so clear. Yet the inventor did have the courage to introduce a dotted line (the only surveyed notation to do so). The reference pitch C is on a space, but the symmetrical pattern is actually line oriented around Eb (broken line) and A (dotted line). See the diagram below. He likely used A as his reference, since he also numbers the pitches starting on A. The reference literature showed no bar-lines, but I have put them in the notation anyway. He can also be commended for including a key signature.



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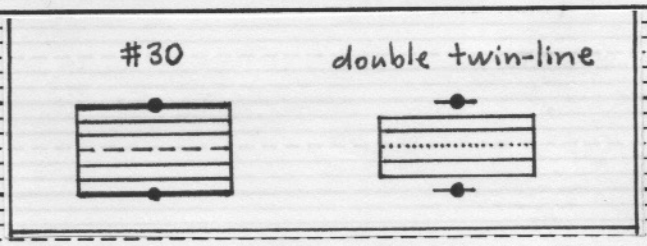
#30
Classification: 2-phase, symmetrical, line orientation

This staff configuration is pattern **e** in the set on page 25. It has been chosen as one of the 'six best,' not because it is itself *so* excellent, but in order to make an important point. As long as the reference pitch (C) and its tritone are in some way highlighted, the staff is relatively easy to read. This particular configuration can best be judged as another 'liney' variant of the *double twin-line*, as shown in the diagram below. By using a solid bold line rather than a ledger line, the inventor has forfeited the opportunity to delineate the octaves in the clearest manner. As a result of this decision, too many lines must be used. Still, it is one of the better notations in this survey.



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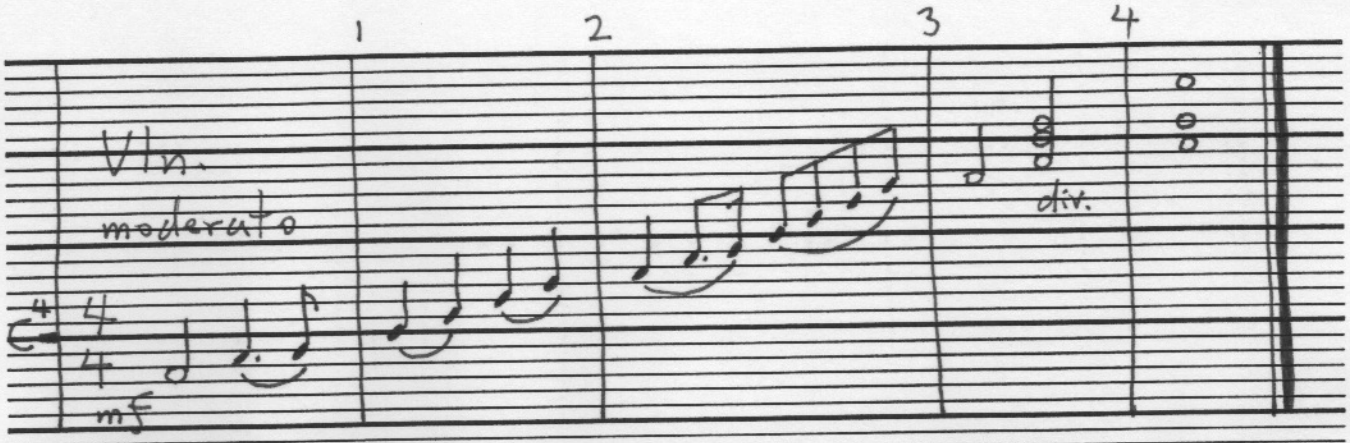
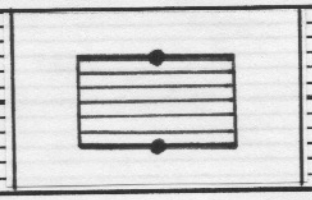


#31
Classification: 2-phase, symmetrical, line orientation

This one is very poor—*lost in a sea of lines*. It constitutes another example that proves the point made in #30. In order to be decently readable, the reference pitch *and* its tritone must somehow be highlighted, so that one can 'find one's bearings' in the chromatic scale. In this example, only the reference pitch C is highlighted (by a bold line). Consequently, it is quite difficult to 'navigate.' In fact, the only way in which it could be made *worse* would be to remove the bold line and replace it with a normal solid line. Then the 'disorientation' would be complete. Not only #31, but also the next two notations (#32 and #33) use this extremely unbalanced staff configuration (pattern **a** in the set on page 25). This small group represents the extreme of *too many lines*.



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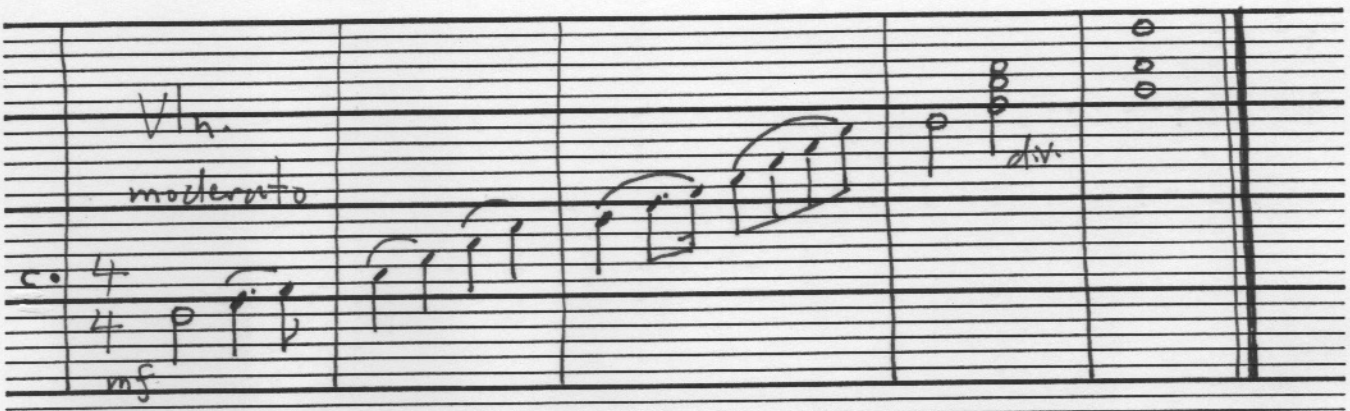
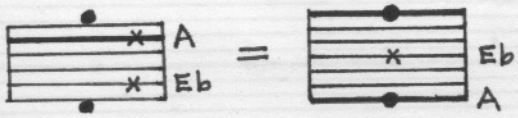


#32
Classification: 2-phase, asymmetrical, space orientation

This staff configuration is subject to the same criticisms made about #31. The difference here lies only in the reference pitch (the bold line), which is A rather than C. For a discussion on the use of A as a reference, see page 29. This staff is really symmetrical and line oriented around A-Eb (see the diagram below). It appears that the inventor intended his staff to be only discontinuous with added ledger lines—a bad idea since even melody instruments tend to use a minimum of two octaves. I have used a continuous staff version here.



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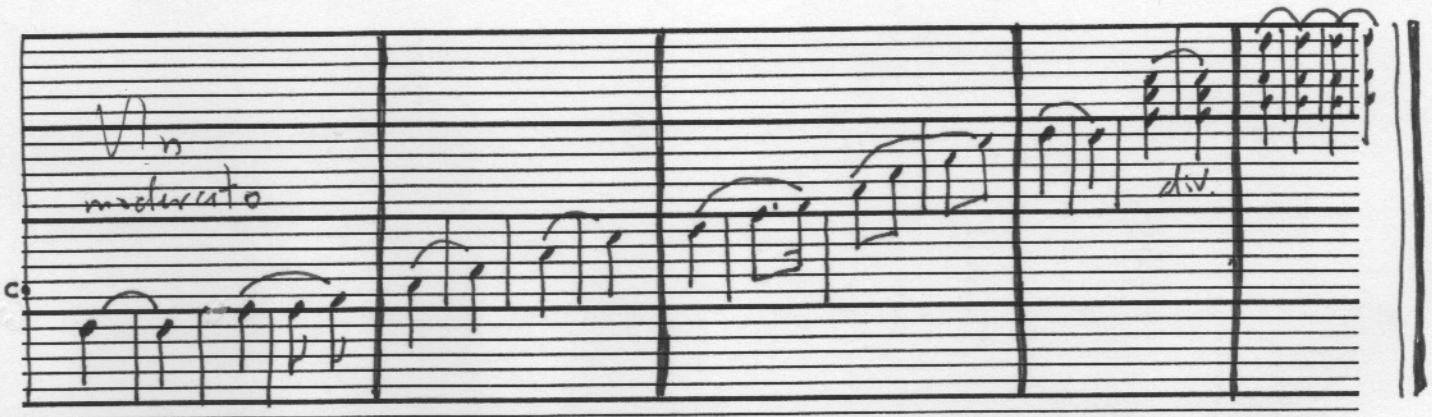
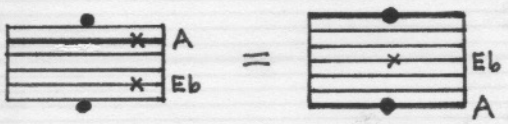


#33
Classification: 2-phase, asymmetrical, space orientation

This notation is also subject to the severe criticism given for #31 and #32. In fact, it is just like #32 except that the inventor has 'improved' the system of bar-lines. He has (needlessly) added beat-lines; consequently, the bar-lines must be heavy and half-notes must be tied over. This pointless 'improvement' takes up space and adds confusion. Apparently, this inventor was also inspired by a 6-6 keyboard.



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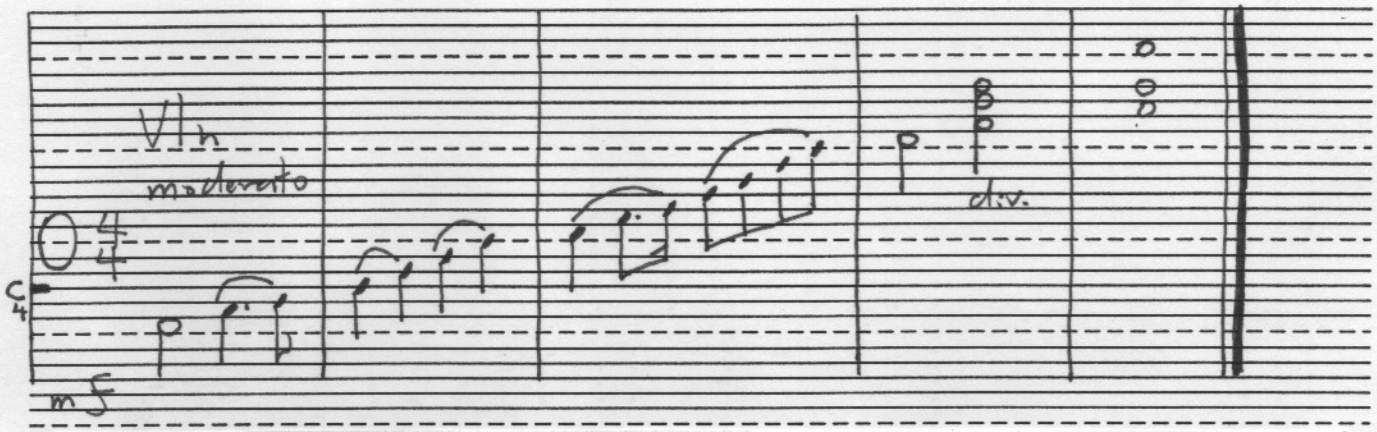
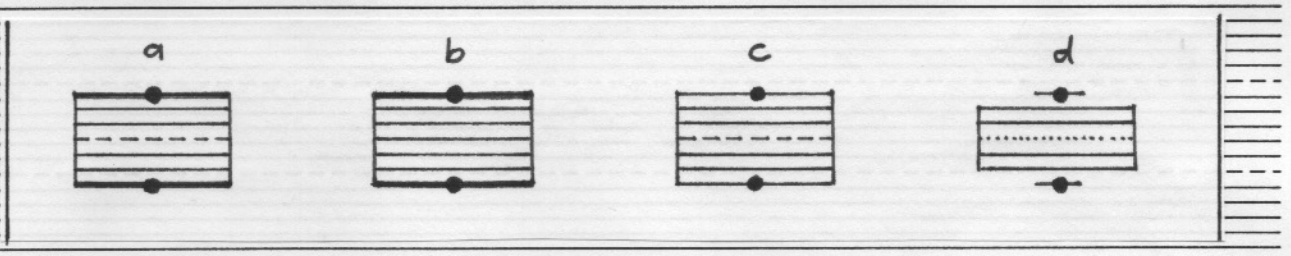
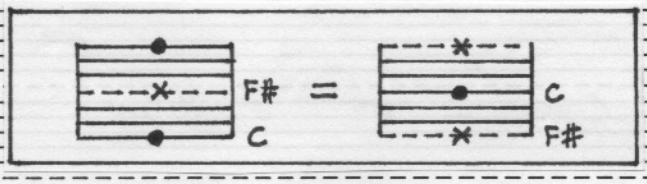


#34
Classification: 2-phase, symmetrical, line orientation

This staff configuration should be compared to #30 and #31. In the diagram below, #30 is **a**, #31 is **b**, and #34 is **c**. Again we can see that readability is damaged if the reference tone *and* its tritone are not *both* highlighted in the pattern layout. In the case of #34, the reference C is not highlighted, only its tritone (by a broken line). As a result, the pattern is too 'liney.' Compare it to the optimal *double twin-line* shown as **d** below.





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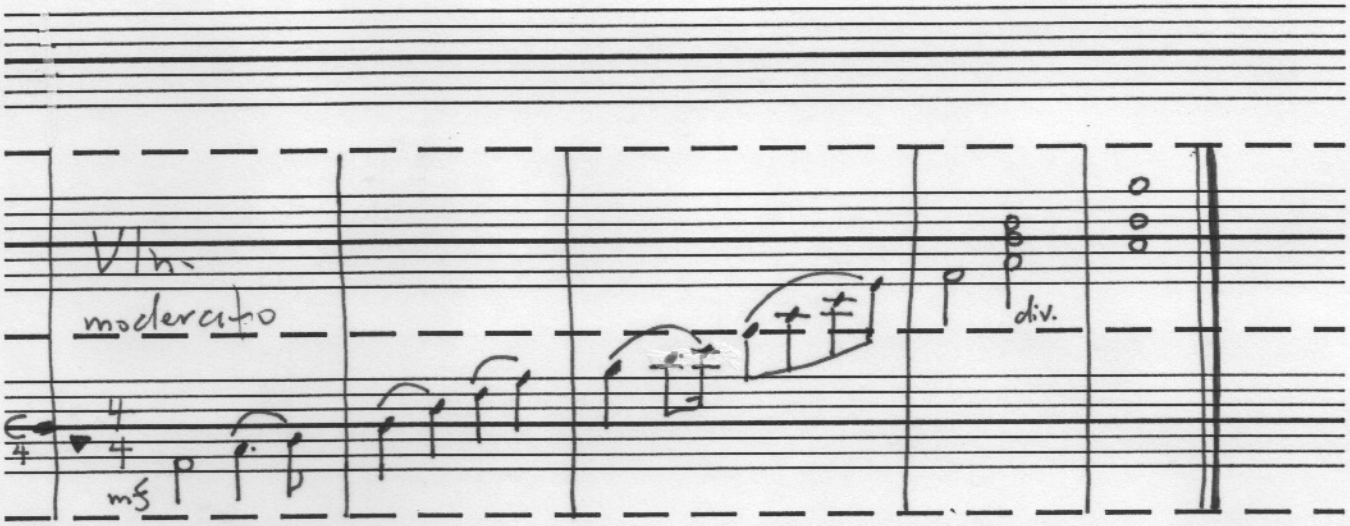
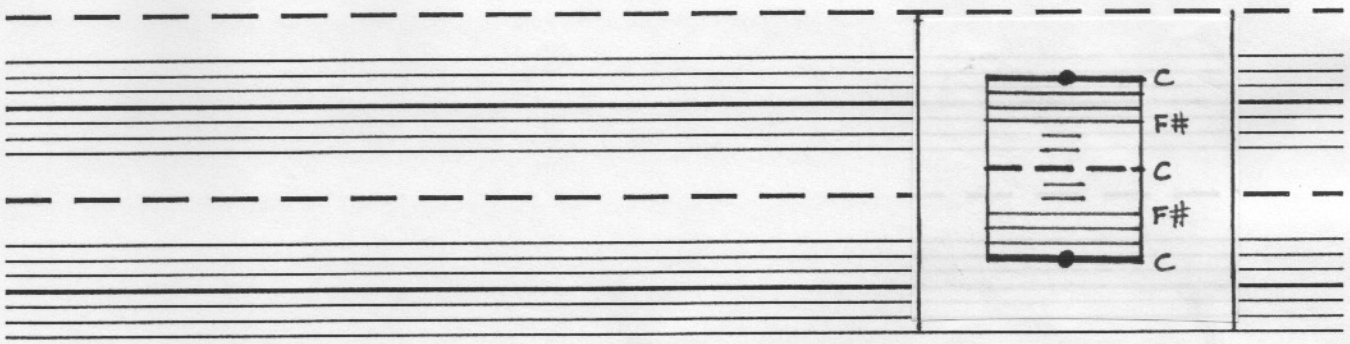


#35
Classification: 2-phase, symmetrical, line orientation

This proposal is *really bad* for several reasons. It has far too many lines and far too many spaces. The inventor has managed to achieve a new low in ergonomic value by rejecting the principle of pattern repetition at the octave. The pattern is actually cyclical every *two* octaves, as shown on the diagram below. Consequently, one octave (F# to F#) is practically 'all lines,' and the other is practically 'all spaces.' The 'advantages' of such an unfortunate decision are never spelled out. Also, he uses an esoteric (almost absurd) system for designating the tonality. An upward triangle can mean both a major and a minor key, as long as it has sharps. In the example above, the downward triangle written on pitch position Bb could mean Bb major, but it actually means G minor. Why not just write G minor instead? This staff configuration is so quirky that it isn't represented at all in the set of 2-phase symmetrical line-oriented patterns given on page 25. Those staves are all octave cyclical, whereas #35 is double-octave cyclical. This proposal must be one of the most eccentric staff configurations in this survey.



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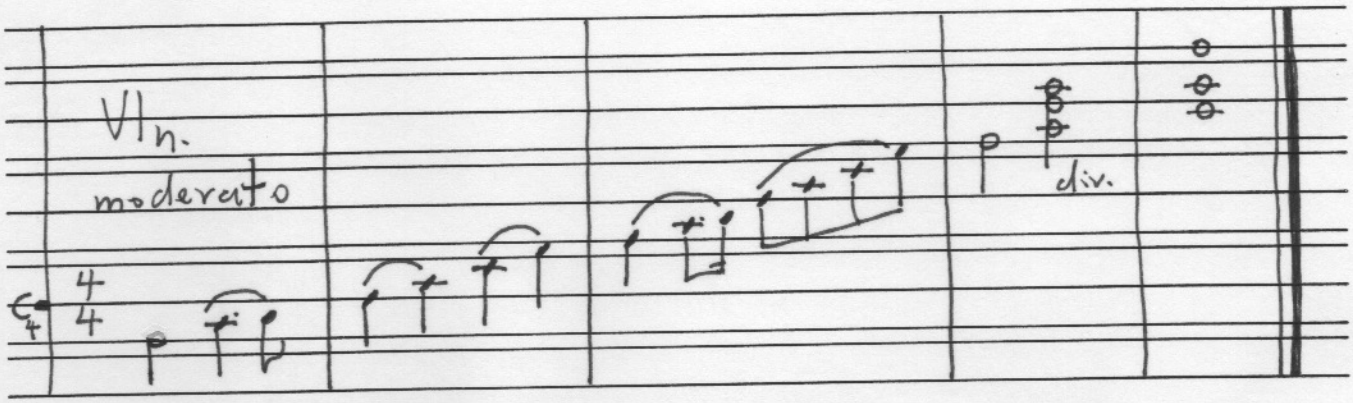
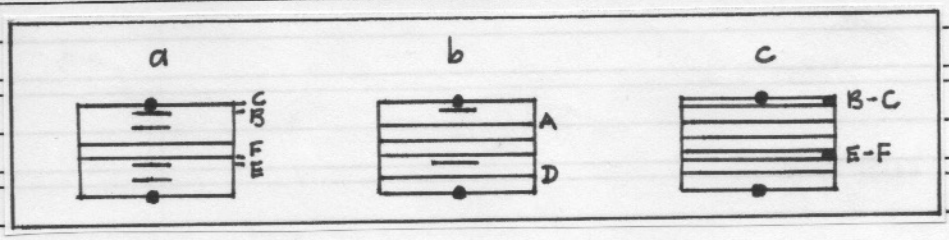


#36
Classification: irregular, line orientation

Although I didn't include them among my 'six best,' I found #36 and #37 very interesting, since they 'swim against the current.' Practically all of the notations in this survey value proportionality and propose to implement it using a regular 2-phase or 4-phase arrangement. But these two notations embrace *irregularity* in the line spacing. Hence they pose the question whether strict proportionality is really *so* important in the notation. In both of these notations, the 'white' keys of the standard keyboard are written on lines and the 'black' keys on spaces. This interesting arrangement is achieved by putting some lines very close together (1 mm. spacing) and not using the space between them. In this way the semitones E-F and B-C are highlighted in the layout rather than the 2-fold symmetry between C-F#. The disadvantage (at least for me) is the difficulty of reading a 1 mm. line spacing, especially in #37. With #36 it is a bit easier since it is always use as a ledger line. #36 is perhaps a bit too spacey. This unbalance could be corrected (maybe) by adding the lines for D and A. #36 is represented as **a** below, and with the additional lines **b**. However, it is debatable whether this move is a real improvement. When all the lines are states, as in **c** below, it then becomes a lot like #37. The layout of **c** begins to display the D-symmetry inherent in the 12-et diatonic scale (which is not present in the just intonation diatonic scale). #37 amends this **c** pattern to make the D-symmetry more obvious.



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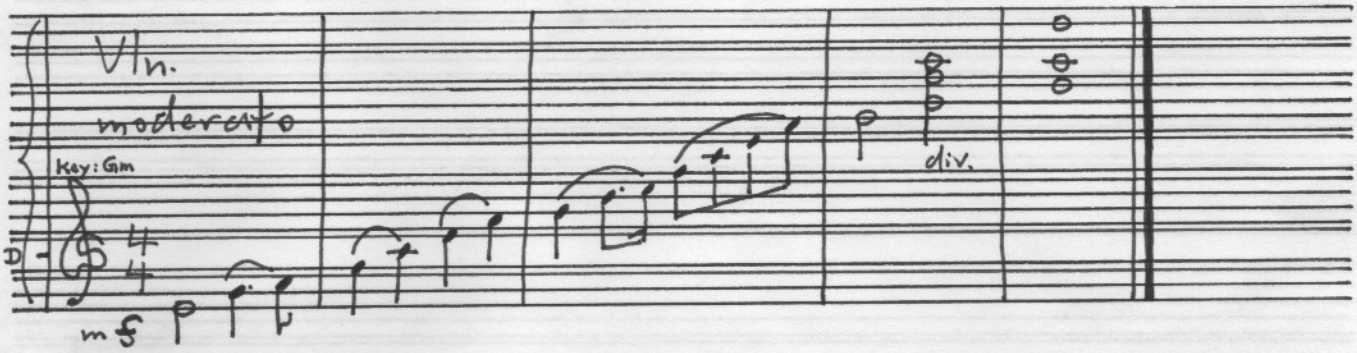
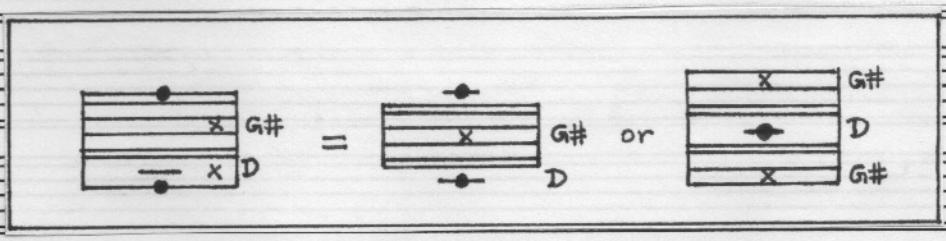


#37
Classification: irregular, line orientation

This notation is like #36 in its underlying conception. The main difference appears to be the deliberate emphasis on the D-symmetry through the use of an 'auspicious' ledger line. This symmetry is illustrated by the diagram below. Like #36, this notation is interesting for its originality, but the 1 mm. spacing is difficult to read—I confuse E with F and B with C. Also, I see no point in inventing new and elaborate Clef signs when a simple mark for 'middle D' would suffice.



AFTERTHOUGHTS

This notation, like the others in this collection, appears to be invented by a keyboard player and intended for other keyboard players. Whether these notations have the right to be called 'universal' is debatable, especially those that degenerate into tablatures. Although many of these staff configurations are intended to be 'split' between a left hand and a right hand suitable for keyboards, I have focused on a *continuous staff* as more suitable for the violin extract used here. But one can even question whether a notation that 'eliminates' sharps and flats is even suitable for violin music, when the violin is perfectly capable of enharmonic distinctions. The set of notations presented in this survey is perhaps narrowly suited for *atonal keyboard music* rather than tonal music for strings or other instruments. For this reason I regard them with a certain suspicion. The intonational limitations of keyboards should not be allowed to dominate the rich world of harmony available to other instruments.

Evaluator: S.T. (continued over the page) Date: _____

That being said, there may be real advantages in readability by using a proportional staff. But the standard staff configuration *also* has certain advantages over the proportional contenders. Most notably, it spaces the octave into 8 mm. rather than the 'stretchy' 12 mm.—it is more 'compact,' but not overly compact. Is this advantage in compactness worth its irregularity? As far as I am concerned, the jury is still out on this one, but this much can be said for certain. Whatever staff configuration we *do* choose to use, it becomes workable or manageable once we have spent enough time using it. There's no reason that each of us cannot use our *own* favorite, however anathema that particular pattern may be to someone else, as long as it is 'translatable' into the standard version. However, in using our 'private' notation, we are expressly diminishing our ability to communicate, since most musicians *are* trained to use the standard staff notation.

The situation reminds me a bit about the new configurations for the *typing* keyboard. Some recent developments are definite improvements, but I learned to type in high school (some 30 years ago), so that it is not worth it for me (and perhaps people in general) to *unlearn* it for another approach. The standard typing keyboard is already *so* entrenched, and millions of them are being used. Unfortunately for these new music notations, I must also unlearn many years of automatic associations. For example, the musical fifth on the chromatic staff looks like an octave on the old standard staff. When I see that spacing I automatically think 'octave' when I read music. But now I must make a new association and try not to confuse the alternative systems. For a person like me who has read music in the old manner for many years, it's probably not worth it. But for the person who is just learning to read, then perhaps it is worth the effort. I am sure that it is quite possible to become fluent in a number of alternative systems (no matter how exotic), just as one learns to read several verbal languages. Be that as it may, we *should* place real value on a *standard* that maximizes communication between musicians. Since that standard (however flawed) already exists, it becomes difficult to dislodge it. Imposing a new standard is no easy task. Is the dislocation even worth the effort? Judging by the poor success rate of the suggestions made over the last two centuries, most musicians have decided that it just isn't worth the trouble. Even though some of the notations in this survey may be very good, we should not expect that they will displace the very widespread and workable standard notation.

COMMENTARY ON THE 'SIX BEST'

Siemen Terpstra

When I was deciding which of the 37 notation proposals to choose as the 'six best,' I was driven by a desire to find a 'best' 2-phase, 3-phase, and 4-phase approach in the set of proposals. The particular collection then determined my best options. Amongst the 2-phase or chromatic notations, I chose #11, #16, and #30 because each had certain positive features somewhat like the optimal *double twin-line*, although none of them were quite so good as the *double twin-line* itself. On the other hand, each one also has extraneous features that are best rejected. For example, #11 has a decently good staff configuration, but it uses an alternating 'black and white' pattern with its attendant change of the time values suited to a 6-6 keyboard. Personally, I would rather see the traditional duration symbols used on this staff. #16 and #30 have 'variant' staff configurations that are closely related to the *double twin-line*. At the same time, they are free from the restrictive 6-6 format. In trying to find an optimal format, I have found the need to 'tamper' with these proposals a little bit, in order to save the best features of each.

When it comes to the 4-phase proposals, I felt compelled to chose a 'best' proportional *twin-line* layout, and also a 'best'candidate amongst the sub-group that uses alternative note-head shapes. In the first category it was inevitably between #3 and #7. Both of them put down a classical *twin-line* format, but I chose #7 because it had *less* objectionable features than #3. Yet #7 as it is also has many problems for me. I feel compelled to rid it of some of these deleterious features and present it as a proportional 4-phase notation with the traditional time values. Unfortunately, this option had not been given in the set. In truth, I could also have chosen #3 and instead rid it of *its* bad features. The aim is to present a 'straight' 4-phase staff with traditional time values.

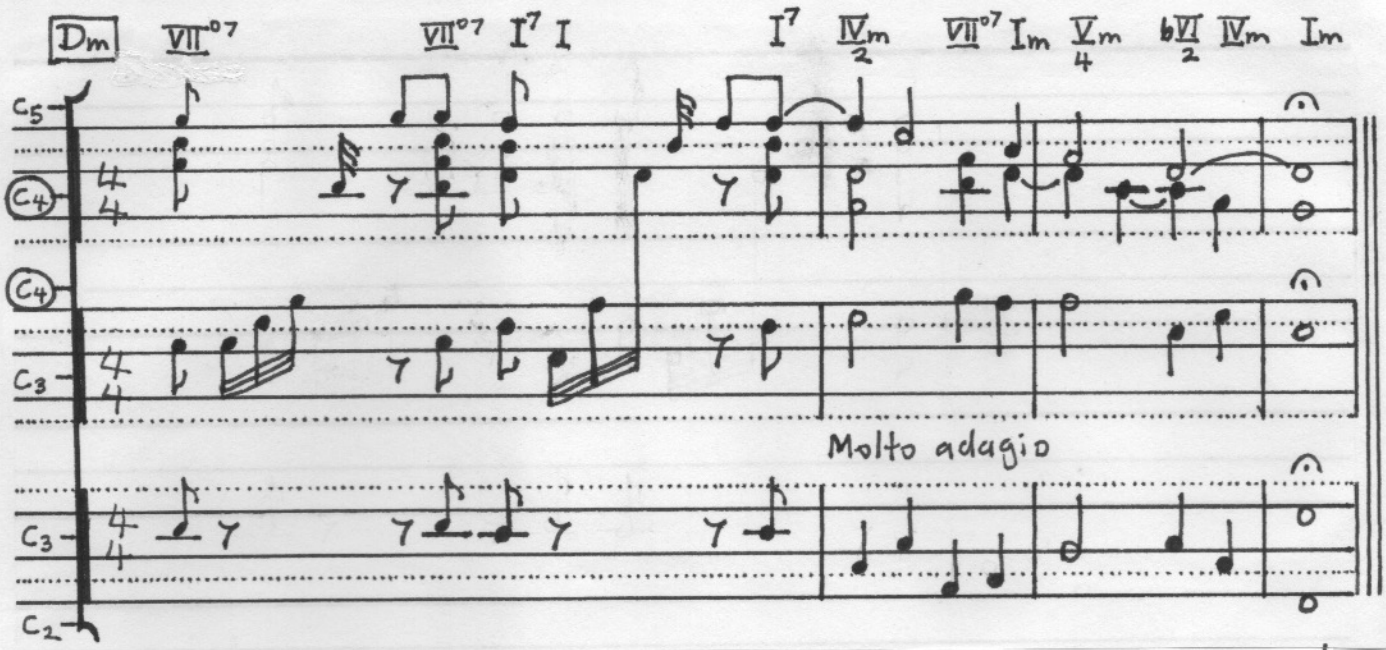
Similarly, with the alternative note-head group (#4, #5, and #6), #6 seemed the least objectionable, but it also had quirks I would amend. Again there was a need to change it somewhat so that it would embody what I consider the best overall features.

Concerning the 3-phase approach, I was left with no option, since only one example was included in the set, #2. Here I was strongly compelled to 'bang it into shape' in order to make it even workable. I necessarily had to change many features of the inventor's notation, so as to present what I would term a decently usable 3-phase staff. Now it is *not* my intention to be an 'inventor' of yet another new notation. Speaking frankly, I'm quite happy with the standard staff, although I am aware of its flaws. It seems flexible enough for my purposes. But #2 demanded so many alterations that I feel almost like the 'inventor' of something new (at least to me)—the *tri-line* staff. I hope that the committee will forgive this unexpected foray into new territory in my evaluation process. Believe me, it was totally unintended and simply 'jumped out' at me demanding a hearing. I do believe that it *is* definitely worthwhile to include a 3-phase pattern in these deliberations. I have chosen to keep the traditional duration symbols.

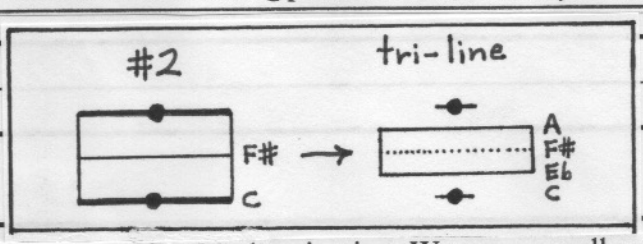
The others in this selection only required small changes and not radical surgery. #30 is presented more or less 'straight.' The changes that I have made will be justified on the appropriate pages of the 'Bach example.'

The particular musical example to be notated also offers an opportunity to look at alternatives to the Grand Staff used in the first block. In the earlier violin example, a *continuous staff* was the best reasonable option. But for organ music, we perhaps need a *discontinuous* staff that separates left hand, right hand, and pedal board. I have also tried to keep the fingering options the same as on the old staff, since it is (I presume) the intentions of the composer. Given the changed context, this group of notations will have a different 'look' than the last group. This is only natural—a staff notation should be flexible so that it can best perform its function in different surroundings. This flexibility is one of the criteria for universality; but universality is not at issue here. The notation needs only to function well for an organ keyboard with foot pedals.

Further comments are made on the individual pages of the Bach example. They are ordered #2, #6, #7, #11, #16, and #30.

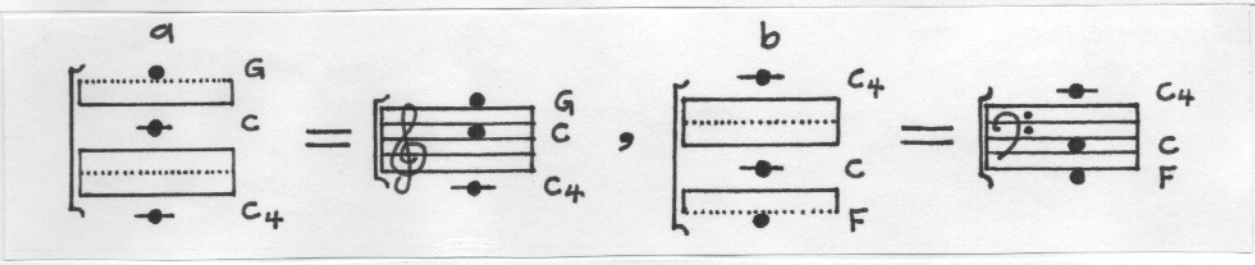


#2, significantly altered to form the ***tri-line*** *configuration.*
Mr. Stuckey's peculiar notation hides two important (indispensable) lines in the 3-phase proportional staff. Rather, it emphasizes only the central tritone relation (which *is* certainly fundamental). The 3-phase staff demands the recognition of positions 'touching above' and 'touching below.' How this is to be done when the line itself is *invisible* totally escapes me. Perhaps the inventor compensated for this totally unworkable staff layout by giving each of the twelve pitches a unique appearance as numbers. Forget it, numbers are a bad idea. Please, let's go back to (readable) circles and/or ovals. One of the reasons that I have notated it in this manner is simply to show that a 3-phase proportional staff is workable while using traditional duration symbols and avoiding esoteric note-head shapes. When the missing lines are restored and the configuration amended to the 'fortunate' *tri-line*, it becomes something *practical* and not only theoretical.



At first this 3-phase approach is a bit disorienting. We are normally used to sighting *lines* and *spaces*. But here we have *no spaces*—being replaced by 'touching above' and 'touching below.' In another sense, we have *more spaces*; in effect, there are *two* notes in the space position rather than one. At any rate, it takes some getting used to. But I found that I became accustomed to it rather quickly and it's certainly useable.

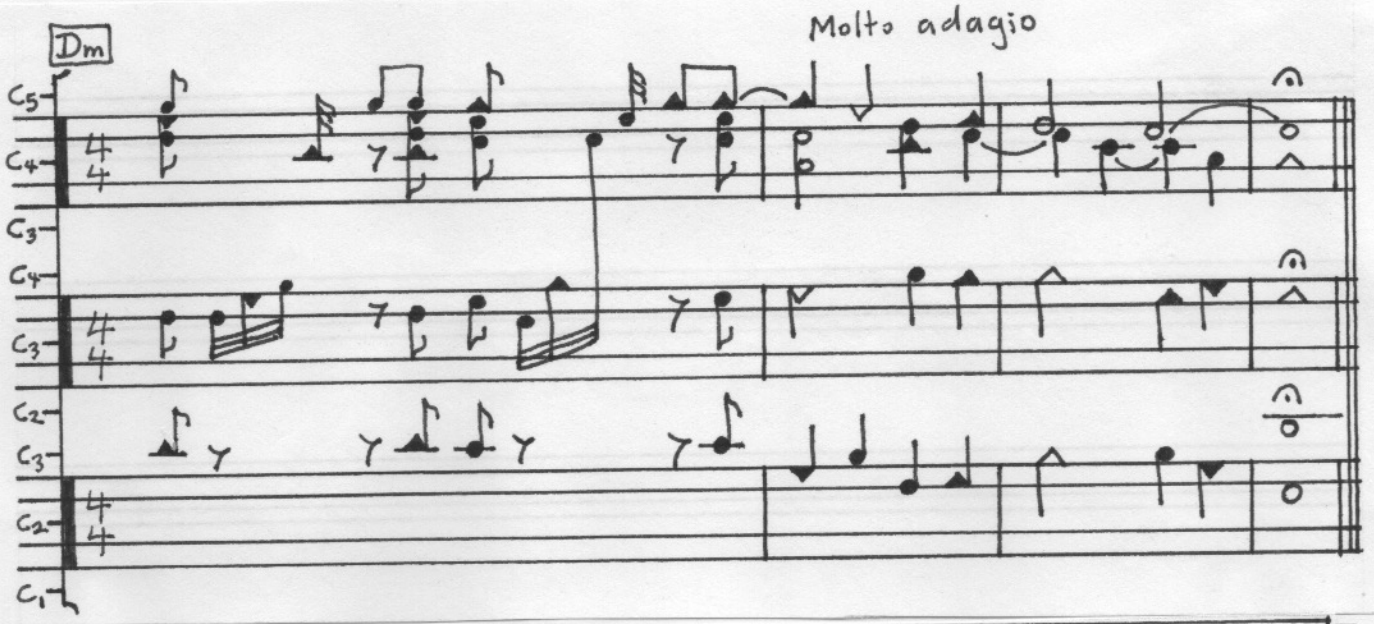
The musical example employs a *discontinuous* organ staff in three sections—right-hand or treble, left-hand or bass, and a bass pedal staff. For the sake of comparison, I felt that it is desirable for the *normal range* of the standard staff to be preserved. The diagram below shows that there are thus two possible orientations for the staff—the fifth above (configuration **a**) and below (configuration **b**). In the diagram they are compared to the standard staff, showing off the 'big spread.' The two configurations (**a** and **b**) can be applied to any register by simply marking middle C (C4) or alternative octaves. In the example itself, the 'down' version of the treble range was used because it suits the tessitura of the harmony line. The pedal staff is using the 'up' configuration. In this way we can keep the advantage of making the various clef signs redundant or unnecessary.



I have taken the trouble to include a brief *functional analysis* of the musical passage, marked above the staff. The reason is this: we witness here the practical importance of the diminished tetrad (VII^{o7}) in the harmony and the characteristic manner of its notation in the 3-hase approach. The three possible diminished chords are expressed through the three positions: line, touching above, and touching below. The use of diminished structures is an important 'signature' of the 12-et harmony system. Hence the 3-phase approach admirably suits the structural properties of 12-et. The tonality (D minor) has been marked at the beginning. The passage displays a classic 'feminine' cadence pattern affiliated with the minor mode.

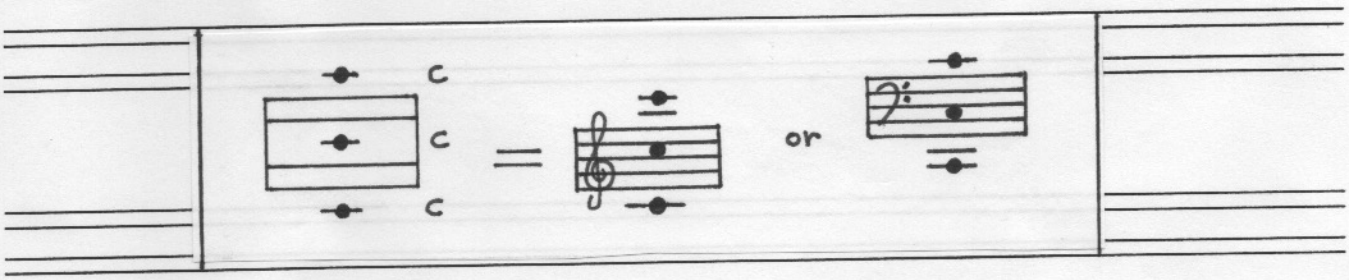
Also, I have taken the extra time to notate it using *circular note-heads* rather than the usual ovals. It cannot be denied that 3-phase and 4-phase staves tend to favor the use of circles rather than ovals in the interest of distinguishing a space position from a 'touching' position. This feature is a *disadvantage* for 3- and 4-phase systems in relation to 2-phase approaches. For ovals are a bit 'faster' than circles. Indeed, when I'm scribbling in a hurry, the ovals thin out and tend to become 'lines.' This is no problem on a 2-phase staff, but it damages legibility on the others.

I have preserved the traditional manner of notating which hand should play a melody note—separating them into the top stave and the middle stave. The distance between the staves is a contentious matter, but we would all agree that it need not be so wide as in the standard staff. For this example, it has been placed at 6 mm. If this music were to be notated on a Grand Staff, which is quite feasible, then the hand positions must be indicated by some other manner. Perhaps this could be done by the judicious placement of flags—to the left or right of the note-heads and in the up or down direction, as was suggested by #14. Some would argue that we should avoid a discontinuous staff altogether and rather *always* use a Grand Staff, since it is more compact and these proportional systems are already quite 'spread out.' While I would myself tend to agree with this stand, a discontinuous staff is also sometimes useful and this excerpt of organ music provides an opportunity to display it. Unfortunately, it amply demonstrates the classical complaint about the wide (12 mm.) octaves. The 'big spread' takes some getting used to. It cannot be avoided when using a proportional approach. This 'big spread' constitutes a valid argument *against* these proportional notations in favor of the standard staff.

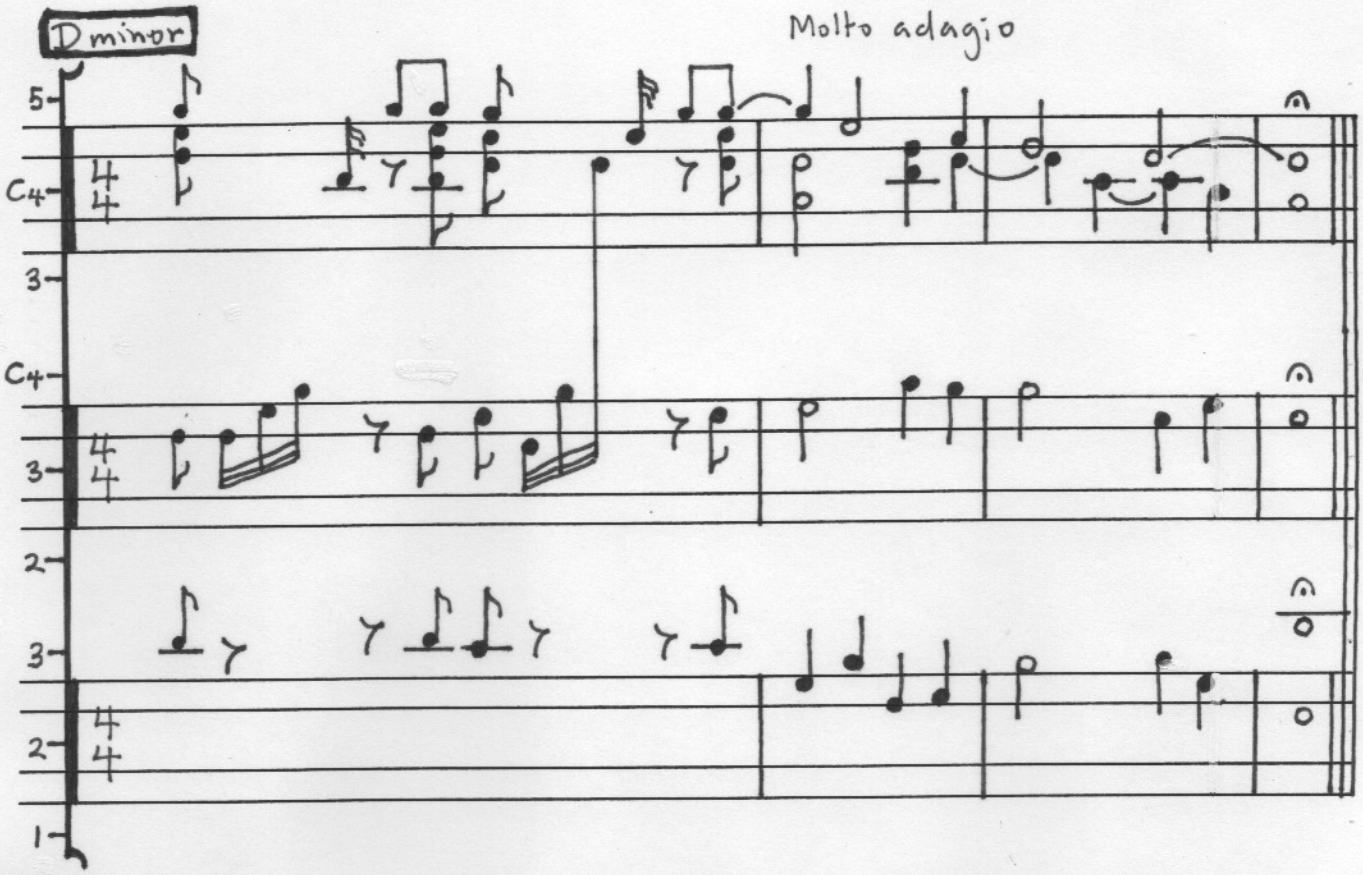


#6, slightly altered into a mid-compression ***twin-line***

This highly creative (and beautiful to look at) notation by Reed-De Vries has been slightly modified like the notation given on page 17 of the first block. The 'over compressed' 2 mm. line spacing is expanded to 3 mm., since it becomes easier to read. The span of an octave then becomes comparable to that of the standard staff, as shown on the diagram below. The traditional notation of durations has been restored. Finally, the range of the 4-phase discontinuous staff has been expanded to two octaves (instead of the more usual octave and a half). This wide range in the 4-phase notation is an advantage over 3-phase and 2-phase notations. Again, note-heads have been made round rather than oval. This move, along with the use of triangular note-heads, has slowed down the writing somewhat.

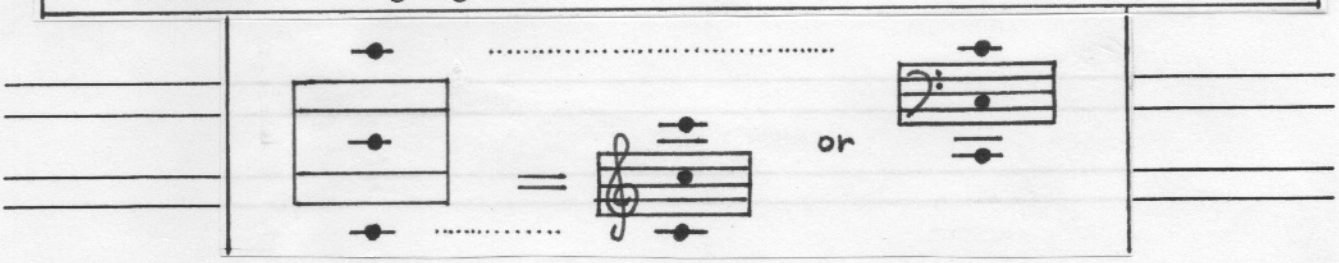


Evaluator: S.T. 5 Date: June/99



#7, Panot, modified into a classic ***twin-line***

In the first block, both #3 and #7 gave a classic proportional 4-phase staff configuration. In such an approach, the F# (for example) should have a genuine 'float;' that is, it should not touch the two lines at all. #3 (Beyreuther) used the 'proper' 4 mm. line spacing. Apparently #7 (Skapski) used an even wider spacing (5 mm.), but 4 mm. is well enough to have a definite 'float.' A glance at the 3 mm. spacing shown on the previous page shows that it is 'on the edge' and thus it needs its alternative note-heads as a compensation. A 'dedicated' *twin-line* demands a clear distinction between 'space' and 'touching' and this can only be achieved by a wide line spacing and/or smallish note-heads. In this version, 4 mm. is used so that again we have the 12 mm. (big spread) octave. Like the other *twin-line* notation given previously, the discontinuous staff consists of two octaves. Consequently, this notation of the discontinuous staff has the biggest spread of all the examples in this group of six. A comparison with the standard staff is shown on the following diagram:



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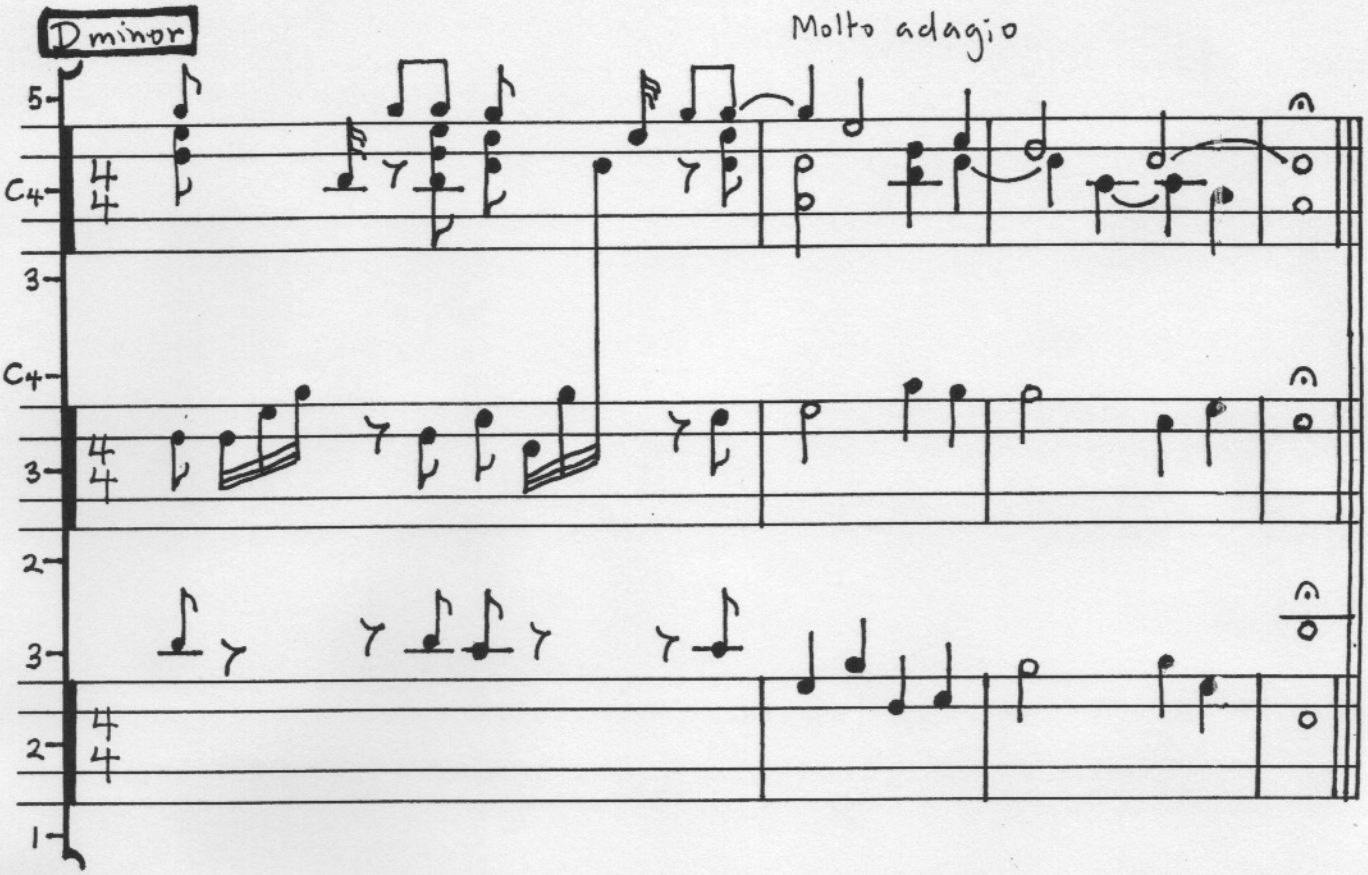

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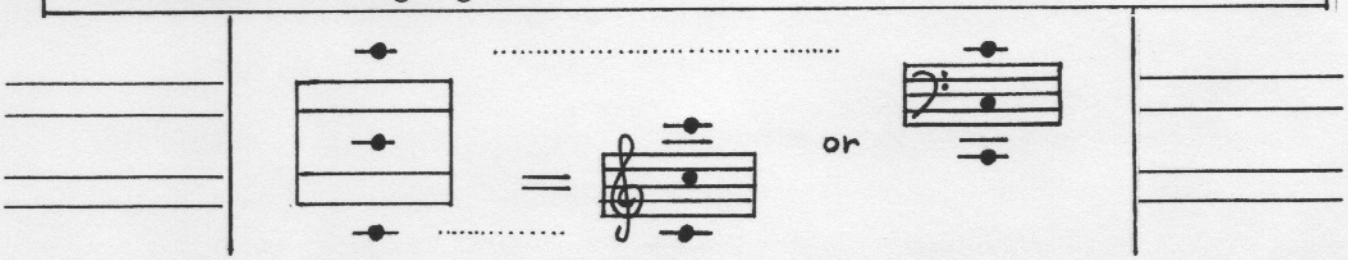

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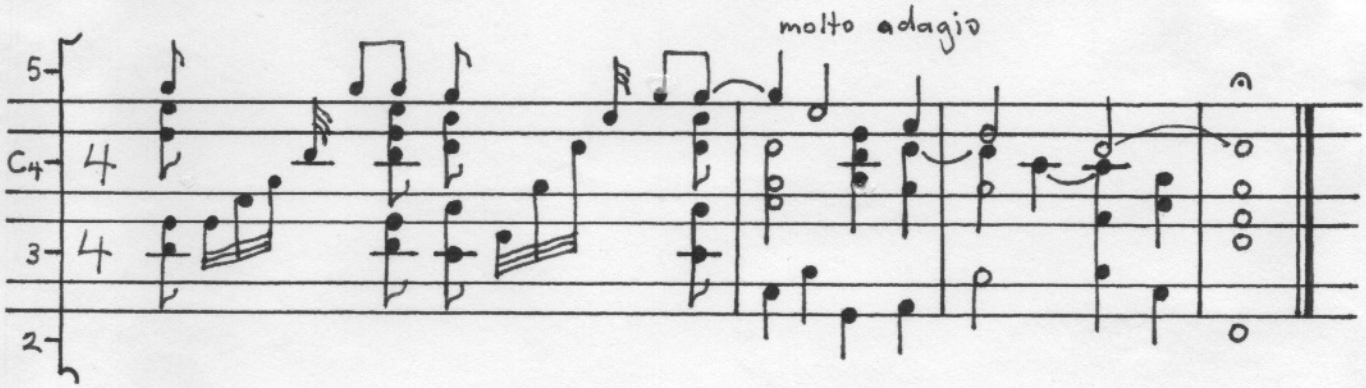
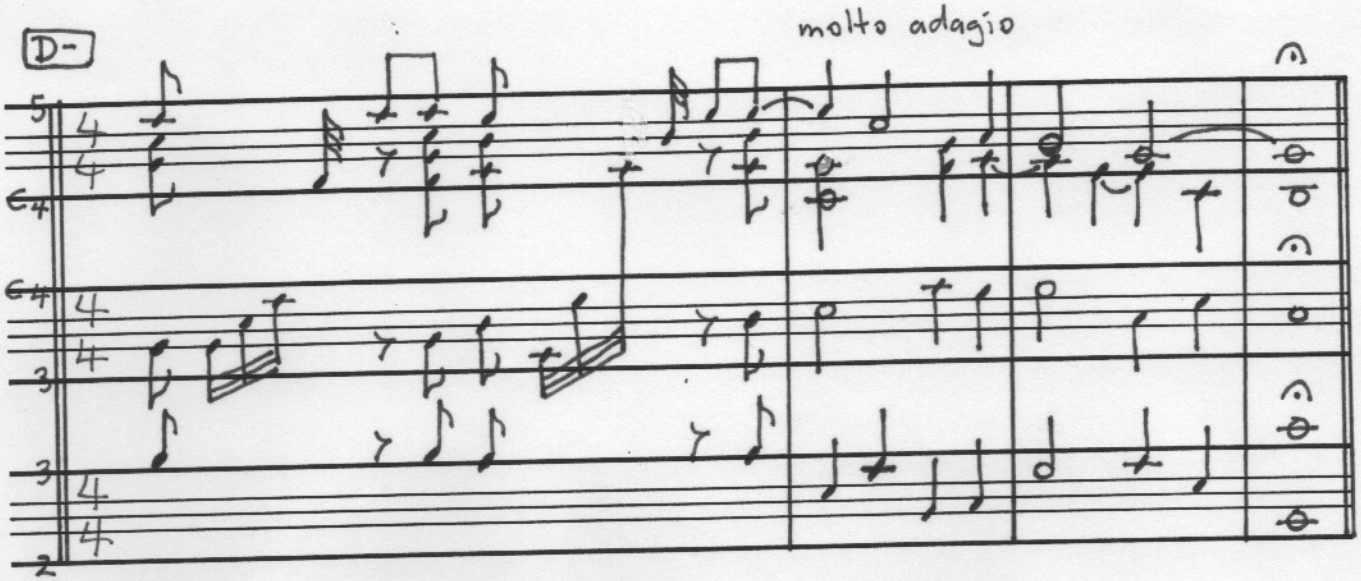
I have kept the round note-heads recommended by Skapski but discarded much of his 'reformations' as dubious suggestions. Why use beat-lines or pulse-lines? Also, he wanted the stems to emerge from the center of the circular note-heads. What ever for? We have a practical advantage in allowing a left or right placement, since it aids in the discrimination of multiple lines on the Grand Staff. His 'reforms' in the notation of rhythms are not at all clear to me, and I have instead opted for the traditional system. Apparently, Skapski wanted to change *every single aspect* of the traditional notation, accompanied by a creative (but pointless) nomenclature. I am told that his formulation required *three volumes* in explanation, making him the 'winner' for the most intricately designed notation in the whole collection of 37. As far as I'm concerned, this effort demonstrates mainly a misplacement of priorities or a certain creative perversity. Most of his suggestions do damage rather than aid in readability.

Still, I judged that a *twin-line* notation was desirable among the 'semi-finalists.' It did not matter whether #3 or #7 would be chosen, since both of them had so many objectionable features. Nevertheless, either one could be modified into a classic *twin-line*—a very 'spacey' notation in its paucity of lines and its 'floating' positions. The peculiar *vastness* of this notation is here exaggerated by the needlessly wide placement of the discontinuous staves that were provided on the mimeographed manuscript. In my estimation, their 'estrangement' could be reduced by about one-third without major problems.

Perhaps more than the 2-phase approach, a 4-phase notation favors a Grand Staff over a discontinuous staff—in order to 'solidify' its spaciousness. For the sake of comparisons, here is the Bach example notated on the 4-phase Grand Staff. No efforts have been made to distinguish the two hands and foot pedals. The aim is only to observe how much more 'compact' the Grand Staff sits in comparison with a discontinuous staff.





#11, with traditional duration symbols

I have notated Rich Reed's 'DA Music' notation as is, except for the alternating black-and-white scheme and its attendant duration symbols. Again I've gone back to the traditional time symbols. The rationale for justifying the black-and-white scheme does not impress me. It is justified in order to implement a 6-6 tablature, in which case it is not sufficiently universal. It is used to emphasize lines (black) and spaces (white) on the chromatic staff, but this is a bit of an 'over-kill.' It is claimed that it makes the recognition of intervals and chords easier, but this is debatable. Finally, it is meant to avoid a built-in 'bias' towards C major tonality. Instead, the staff is to be dominated by the wholetone scalar structure. Is this an improvement? Supporters claim that the wholetone 'bias' is worthwhile because it is entirely *atonal* and not tonally biased toward C. On the other side, I would argue that it is both useful and valid to have *some reference point* and that it may as well be C. Most music, in fact, is tonal. It has always been so and will probably always be so. Tonal music benefits from the establishment of a reference point, since the patterns of relations (harmonic functions) are what is really important, not the pitches *per se*. The reading of a pattern of relations is aided by a reference point (the tonality). Atonal music attempts (by intellectual-artificial means) to eliminate functional relations so that we are left with only 'pitch-class.' The 6-6 color scheme promotes this atonality and reinforces my suspicion that these new notations are biased toward atonal keyboard music. In my estimation, the recent western attempt to eliminate tonal relations is a 20th century quirk, ultimately doomed as a rather tedious 'high wire act.' The true richness of music lies in its functional relations. Notations that try to be totally atonal cannot help but be artificial, for tonality is itself consistent with nature (the harmonic series). Hence I have rejected the wholetone bias in the notation. Concerning another matter, the discontinuous staff used here covers only one octave. It appears that all of the manuscript templates provided have this same restricted range. However, the standard staff covers (roughly) an octave and a half. I don't see why this normal range has not been applied to the new notations. Restricting the range to one octave assures the need for a lot of unnecessary ledger lines. Consequently, in most of the six notations I've restored the normal (and much more practical) range.

#16, modified to form **Double Twin-line**

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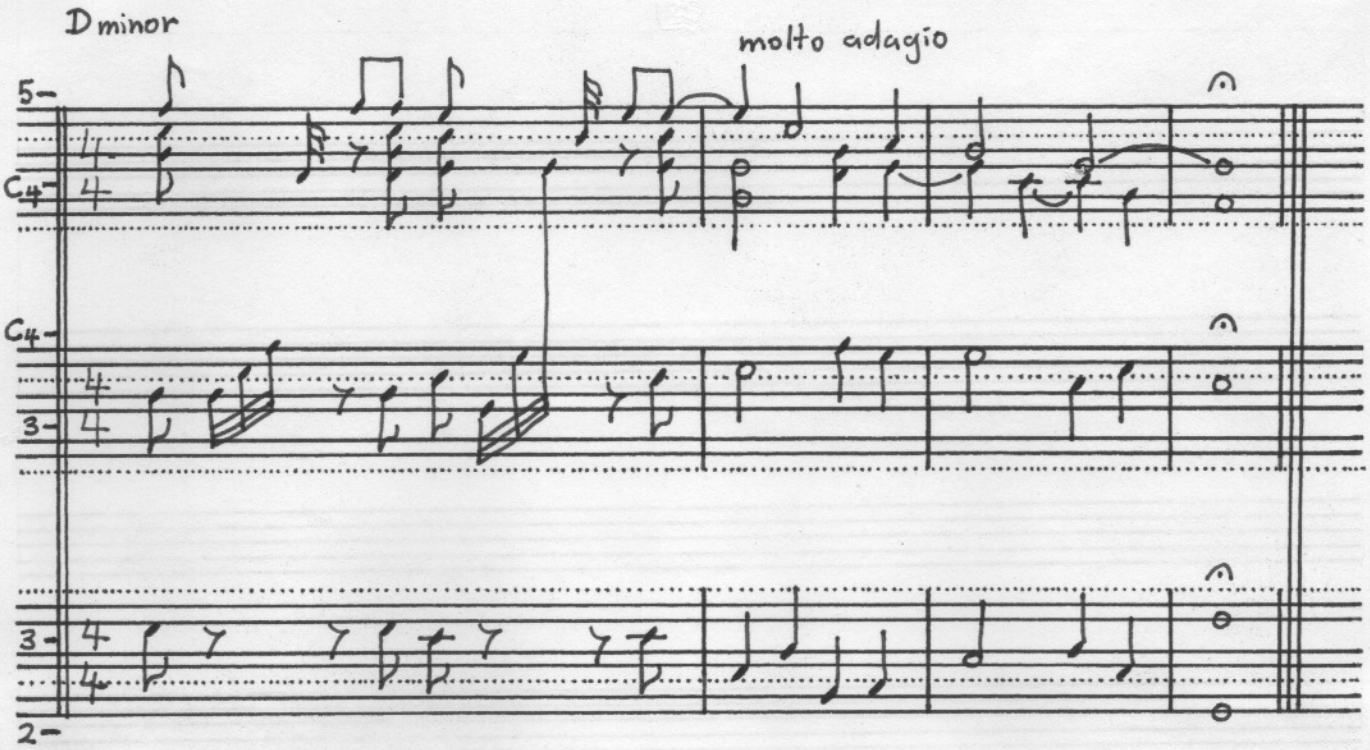
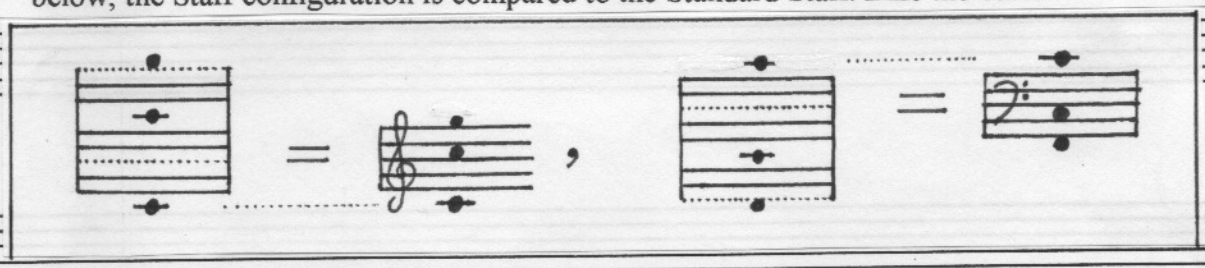


#16, modified to form the ***Double Twin-line***

Judging by the many names associated with #16, this proposal appears to have a lot of followers. It is recommended by Brandt, Huntington, Richter, Sacher, Vincent, Wilbert, Wolf, and Schumann. Perhaps ergonomic considerations are not even an issue for these people. Their main interest may lie only in 'recycling' the old standard five-line staff. At any rate not one of them noticed that five undifferentiated lines *may* be a bit difficult to read. Most importantly, they did not reflect on the need to highlight *both* the reference (C) and its tritone (F#). As it is, the staff is too 'liney,' but one simple change transforms it into practicality. Since the followers of #16 did not spot this fortunate variant, their motivation was probably only a straightforward 'retooling' of the standard staff.

The version presented here uses the *Double Twin-line* variant of the staff. The normal span of about one and a half octaves has been maintained. The three parts of the discontinuous staff are 'off-set' perhaps too far, emphasizing the 'spread' of the system. In contrast, the excerpt is also notated on a Grand Staff over the page. On the diagram below, the Staff configuration is compared to the Standard Staff. Like the other



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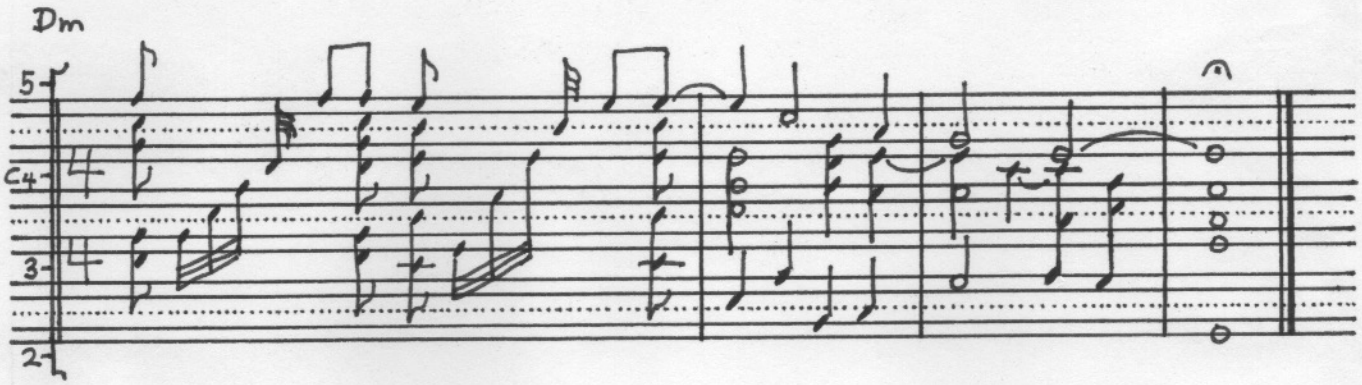
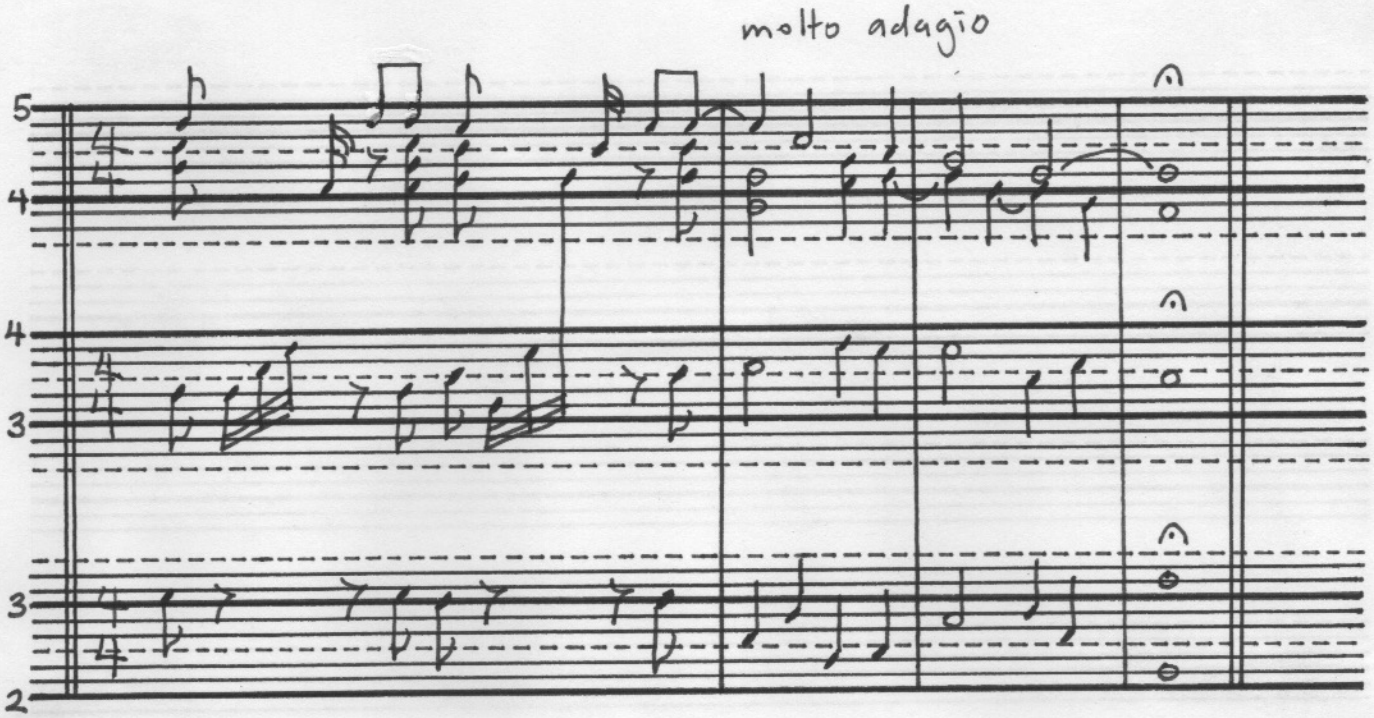
proportional layouts, the octave is 12 mm. wide (rather than the standard 8). Within the context of this wide spacing, the *Double Twin-line* has the best readability amongst chromatic layouts. I also found it faster to write than the 2- and 3-phase notations, since oval note-heads are quite workable. All-in-all, this one is the most fortunate amongst the chromatic staves.





#30

This one is presented 'straight' as an example of one of the decent staff configurations in the chromatic context. The staff is too 'liney,' yet it fulfills the necessary condition that both the reference tone and its tritone are emphasized. Instead of the more useful ledger line, a heavy solid line emphasizes the reference C. As usual, a one-and-a-half octave span is maintained for each staff. Even in the discontinuous staff, we see too much concentration of lines. Yet it is quite workable and has aspects in common with the *Double Twin-line*. The staves are set closer together than those of #16.

AFTERTHOUGHTS

In this set of six notations, not one sharp or flat has been seen. It appears that this 'expulsion' must be one of the chief motivations of the inventors. Yet I question the wisdom of eliminating accidentals from baroque organ music. In the Germany of Bach's day, most organs were tuned to Silbermann's variety of meantone (one-sixth comma meantone—a system with characteristics roughly halfway between standard meantone and equal-temperament). This tuning approach still preserved a distinction between sharps and flats. Thus the old notation has real meaning within this historical musical context. Baroque keyboards that are easily re-tunable, such as harpsichords and clavichords, were generally tuned to varieties of *well-temperament*. In Bach's day, meantone tunings were considered old-fashioned and well-temperaments were in vogue.

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Unfortunately, a lot of moderns think that well-temperament is the same as equal-temperament. Some even think that Bach invented it! Neither statement is true. A well-temperament is an *unequal temperament* in which different fifths have differing amounts of 'miss-tuning.' Fifths on the black keys or 'distant' keys are tuned pure; while fifths on the 'common' keys are tuned closer to meantone. The rationale for this rather complex approach is simple. It results in every major and minor chord (and its attendant scale) having a different 'mood' or 'color.' As a result, modulations have real consequences and each key has its own subtle characteristics. Contrary to popular mythology, Bach never liked or used equal-temperament, and even Beethoven and Chopin actually used well-temperaments. Equal-temperament did not come into vogue until about 1870, and even then when people *thought* that they were using equal-temperament it was really a 'shallow' form of well-temperament. Rigorous techniques for implementing and standardizing true equal-temperament did not appear until 1911. The point to take from this glimpse at historical issues is that these modern notations that *assume* equal-temperament are quite *foreign to the baroque musical philosophy and practice*.

One can argue that sharps and flats are necessary in meantone temperaments, but *not* in well-temperaments which always use a single 'compromise' to take the place of the sharp or flat. This is true. But the notation practice of the great classical composers always followed the *correct* meantone norms. This is understandable, since Europeans had been tuning meantone for several hundred years (far longer than the modern system). Actually, a good example of the classical practice is found in this particular Bach fragment. In the first bar, the diminished tetrad C#-E-G-Bb correctly resolves to D major and then D minor. Had he notated it Db-E-G-Bb then it should correctly resolve to F major or F minor (according to traditional meantone harmonic structure). Bach's notation is *always consistent* with correct meantone practice, even when the music is expressly intended for a well-temperament. Unfortunately, these subtleties are lost in equal-temperament, where the given diminished chord can just as well resolve to D major or minor, F major or minor, Ab major or minor, and B major or minor. The unique (and damaging, as far as tonality is concerned) multi-symmetry of 12-et creates this *ambiguity* in its directionality. Meantone temperaments have a structure in which the diminished harmony is less ambiguous in its movement. Needless to say, the old notation was important in order to make these matters doubly clear. Modern musicians are rarely ever taught the structural differences between equal-temperament, well-temperaments, and meantone temperaments. The elimination of sharps and flats from the notation only reinforces the contemporary lack of awareness of these matters, making baroque musical philosophy and practice even less well understood. In the interest of making the 'intentionality' of the baroque composer clear, a notation that preserves sharps and flats should be used. In other words, the new notation proposals run counter to the musical theory and practice of our classical heritage. Instead, these new notations are perhaps suitable only for a portion of recent (20th century) music.

COMMENTARY ON THE THREE 'FRONT RUNNERS'

My first reaction was enthusiastic. At last!—a piece of 20th century piano music, the proper context for a 12-et proportional notation. However, on closer inspection, it became clear that the Ravel segment is quite tonal (in G# minor), indeed, even diatonic. A more appropriate example would have been some piano piece by Schoenberg (his opus 11 perhaps). True, there *are* atonal moments in Ravel (as in Debussey) but they usually just consist of episodes of temporary 'vagueness' (ambiguity of function) within an overall tonality. Such 'temporary lapses' are found as early as Liszt in piano music. It is often difficult to draw a clear boundary between true atonality and complex chromatic tonality. An atonal 'environment' can be maintained by studiously avoiding natural triad chords, using only complex 'linear' chords (especially with lots of tritones and dissonant intervals), and also by 'telescoping' rapid and distant modulations. But a sense of tonality will always intervene if it is given half a chance, since tonal relations are quite natural (and interesting) while atonality is an artificial intellectual construct.

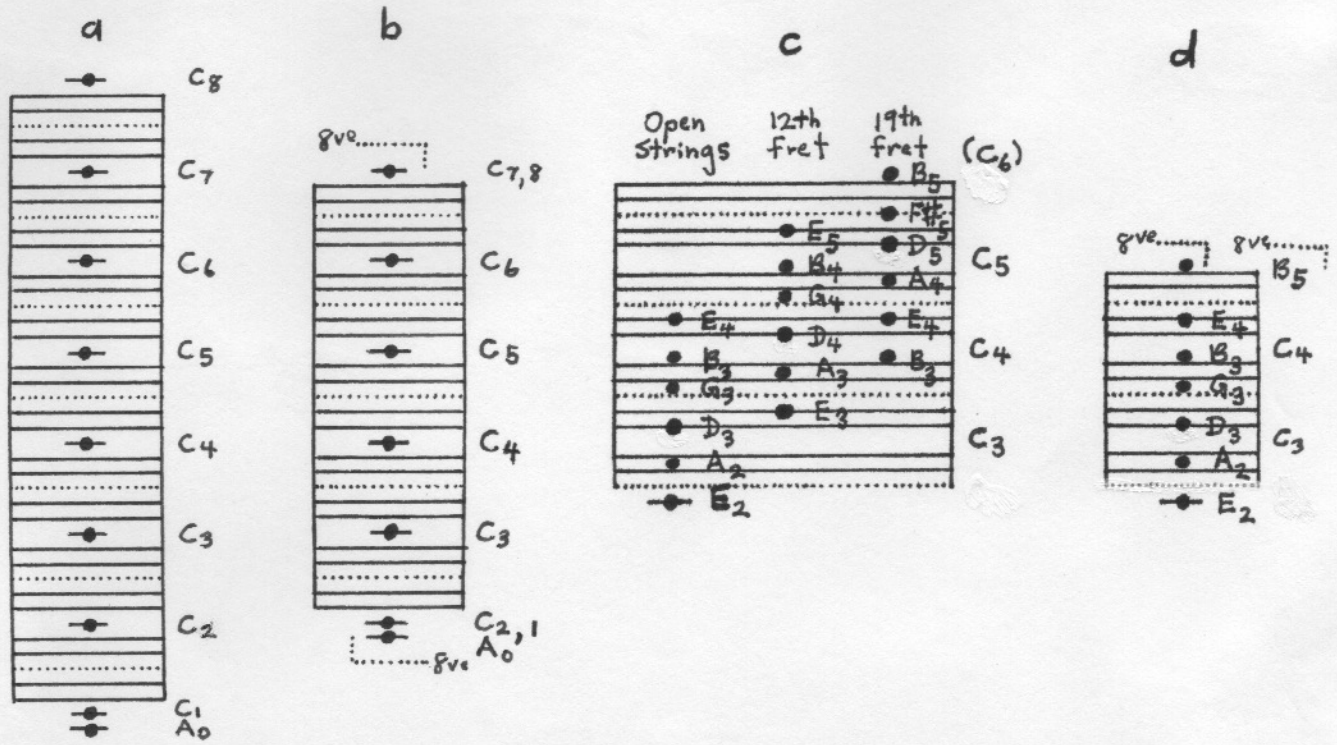
Of all the major systems of harmony, 12-et is best suited to atonality, due to its peculiar multi-symmetry. These 'special' structural characteristics tend to promote a vagueness of function that damages tonality. Invariably, when a passage of 'dubious' tonality is played in 31-et rather than 12-et, the sense of tonality is enhanced. In other words, systems that have a greater harmonic resolution and less symmetry are better suited to an extended tonality (or modality) than to atonality. Perhaps one of the reasons that atonality became fashionable for a time in the 20th century was the fact that 12-et became a rigorous norm. However, this norm is now being slowly undermined by new technologies, by an increased historical understanding, by the growing interest in world music, and by a greater awareness of tuning alternatives. Consequently atonality is becoming increasingly out of fashion, replaced by an interest in new functional relations (expanded tonality).

Perhaps it isn't surprising that this Ravel segment is tonal, since it lies at the beginning of the composition, and since it is scored for piano *and voice*. Atonality has never sat well with vocal music. It is better suited to mechanical instruments like the piano. The human voice is subtle, naturally microtonal, and inherently oriented toward functional relations. Hence atonal vocal music tends to be very difficult to sing. The piano is more suited to atonal styles but the human voice has always countered this tendency.

The Ravel excerpt has been transnotated using the three 'best' proportional orientations: the 2-phase *double twin-line*, 3-phase *tri-line*, and 4-phase *twin-line*. In this evaluation process, one of these notations is to be discarded. It must be the *twin-line*, since it is a bit more difficult to read than the other two notations. I have kept the normal span of the staves and separated the two hands of the piano staff. The many ledger lines necessary at the very beginning have been eliminated by using a conventional 'octave higher' sign, but such a technique could not be used later in the excerpt. In this situation many ledger lines are indeed unavoidable and highlight the drawbacks of the 'big spread.'

The need for so *many ledger lines* in the divided staff argues for a **grand staff** approach for the piano, using alternative means for indicating left and right hand use. Such a staff eliminates the need for so many ledger lines, optimizes compactness, and promotes spacial pattern integration. In spite of these advantages, the result is still the 'big spread.' If we wish to cover the entire piano compass using a *double twin-line*, we would need the immense grand staff pattern shown below in diagram **a**. Using such an 'expanse' it simply isn't possible to get very many staves on a page (two, perhaps three). Unfortunately, this means considerably more page turning for the pianist. The shift from a standard 8mm. octave to a 12mm. octave has noticable consequences in paper consumption. The piano's extensive 7-octave range could be expressed using a more restricted 5-octave staff by employing the octave sign above and below, as shown in diagram **b** below. After all, the top octave and bottom octave on a piano are generally reckoned to be less useful than the middle of the spectrum. Option **b** allows potentially more staves onto a page (perhaps four), but still not very many.

A number of diverse musical instruments need an inclusive staff with a 4-octave span roughly comparable to that of **b**—for example, the clarinet and the 'cello. Another good example is the guitar, whose strings and frets give a range suited to the pattern shown on diagram **c**. Again, we could consider an upper octave sign and reduce it to a 'minimal' core staff shown on diagram **d** below. All of these examples have employed the *double twin-line*, but we could have substituted the *tri-line* or *twin-line* and get the same results. The move to a proportional system resigns us to carrying a more substantial weight of paper.



The 'big spread' has always garnered ammunition against proportional staves and in favor of the traditional diatonically-based staff pattern. I agree with the criticism—the proportional layouts are so 'scattered' in comparison with the wonderfully 'compact' character of the standard staff.

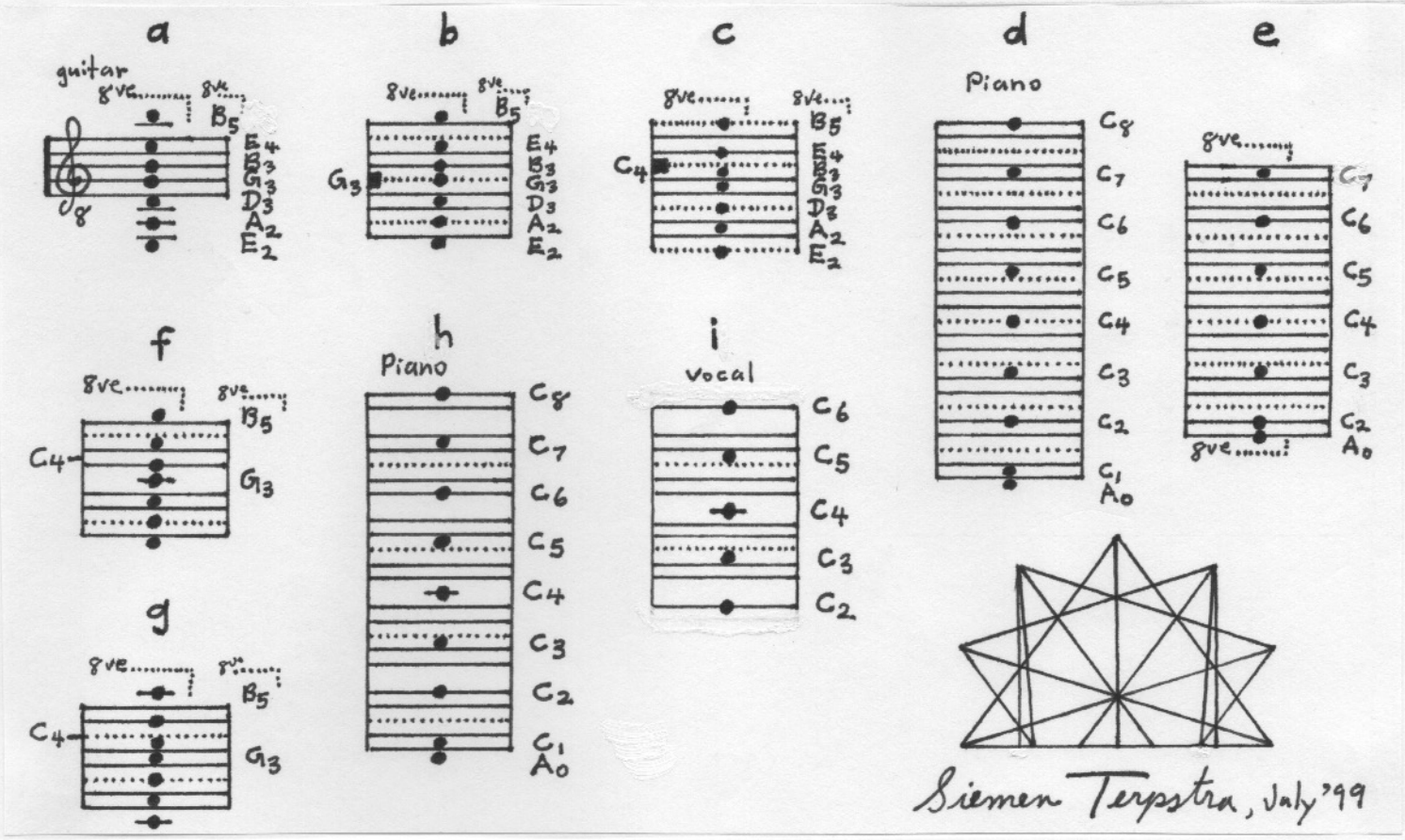
QUASI-DIATONIC STAFF CONFIGURATIONS

Of course, the traditional standard staff is also open to the problem of 'too many ledger lines.' Staying with the guitar as a fine example, the instrument necessitates lots of them, as shown on diagram **a** below. But it is also possible to modify the old diatonic staff in such a way as to eliminated most of the ledger lines. As an idiosyncratic staff suited to the guitar, example **b** below is admirable, although such subtle alterations of the normal pattern have not been included in this survey. It is obvious that our main concerns have focussed on *proportionality as a desirable ideal*. Yet this modified diatonic pattern in **b** below is peculiarly suited to the guitar, partly because of the 'enhancement' of the open A and G strings, and partly because very few ledger lines are needed at all. This staff notation may look a little like the *double twin-line*, but in reality the approaches are totally different. One could reasonably argue that the pitch G3 is the true orientation of this staff (and not the normative C4), since this G3 sits in the middle of the staff. This issue raises the possibility of putting middle C (C4) in the center. Diagram **c** below shows this orientation adapted to the tenor range of the guitar. Pattern **c** is (I think) even preferable over pattern **b** as a guitar staff. Now the open E, A, D, and G strings are peculiarly highlighted on the staff. There is no doubt that such a staff would make guitar music easier to read.

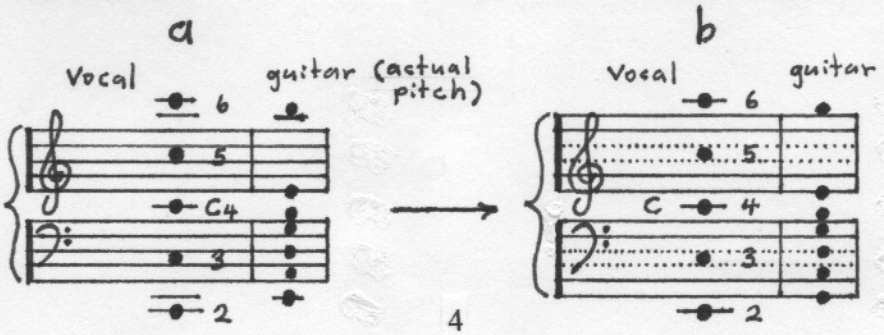
Diagram **d** below shows the 'C orientation' expanded to take on the entire range of the piano. Its very wide compass of seven octaves is much more than the guitar's (or clarinet's) four octaves. Hence the 'big spread' of the proportional notations are particularly evident in the expansion. Diagram **e** below shows the immense piano grand staff reduced somewhat using an octave sign above and below. Compare the spread of **d** and **e** below with the proportional equivalents (**a** and **b** above). The quotient of space saved is considerable. However, this does not mean that I approve of these 'diatonic' staves as more viable than their proportional counterparts. Such a grand staff is still hardly workable because it appears overly abstract. This whole group of non-proportional staves can be dramatically improved by the judicious use of a ledger line. The results give us **f**, **g**, **h**, and **i**. In the case of **f** (a variant of **b**) the improvement puts even more focus on the central G appropriate for guitar. In the case of **g** (a variant of **c**) the outer ledger lines 'compact' the staff in a useful fashion. These two configurations (**f** and **g**) are at variance to **h** and **i** that put middle C on a ledger line rather than a dotted line. The options **h** and **i** are more universally appropriate given our normative C reference. The spacing of the ledger lines around C2 and C6 admirably highlights the traditional vocal range, where most instruments actually sit. In fact, the staff option **i** has been especially tailored just to emphasize this vocal range. Option **h** is designed to cover the entire piano compass (like **d**). One cannot deny that **h** is easier to read than **d**.

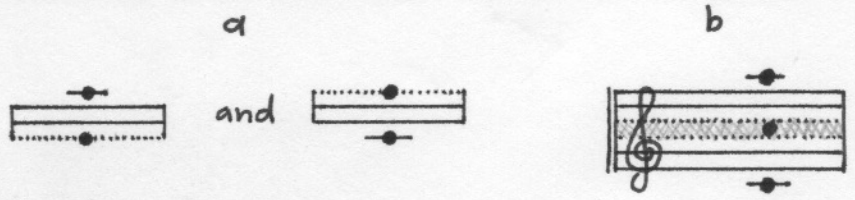
This little diversion into 'quasi-traditional' or 'diatonic' non-proportionality is intended primarily to illustrate the contrast in the spacial layout between proportionality and diatonic 'irrationality.' However, it has also unearthed a variety of staff designs not considered in this survey of 37. This is unfortunate, since these staff configurations have some good qualities. They improve the readability of the traditional staff while at the

same time maintaining the essential characteristics of the traditional notation. They greatly reduce the need for ledger lines and improve 'regional' recognition. For a person like myself, who is accustomed to the old diatonic staff, I find variants such these quite appealing, perhaps mainly because they make an easy accommodation of the interval spaces that I am used to. At any rate, they form a distinctive class of staff configurations that we could call '*quasi-diatonic*' rather than proportional and 'chromatic.'



The staff configurations shown above are already quite practical and workable. However, they still contain certain flaws. Specifically, the pattern is not *octave-invariant*. Rather, the reference C 'wanders' through the pattern in the various octaves. Pattern repetition at the octave is judged to be one of the advantages of the proportional approach. Such octave-based patterning is impossible in the old diatonic approach since the octave sits alternatively on a line and on a space. However, the diatonic approach is amenable to invariance at the *double octave*. Hence we can design a staff configuration that takes this feature into account. On diagram **a** below we see the vocal range (C2 to C6) notated on the traditional grand staff, with its five undifferentiated lines and its necessary ledger lines above and below. On **b** below the grand staff has been modified in such a way that readability is greatly enhanced. At first sight it seems that this design has too many lines (a six line staff rather than five) but the use of the two judiciously placed dotted lines greatly improves the ability to find one's 'neighborhood' in the scale. Considering all of the quasi-diatonic staves presented here, this one is probably the best.





Très lent.

Chant.

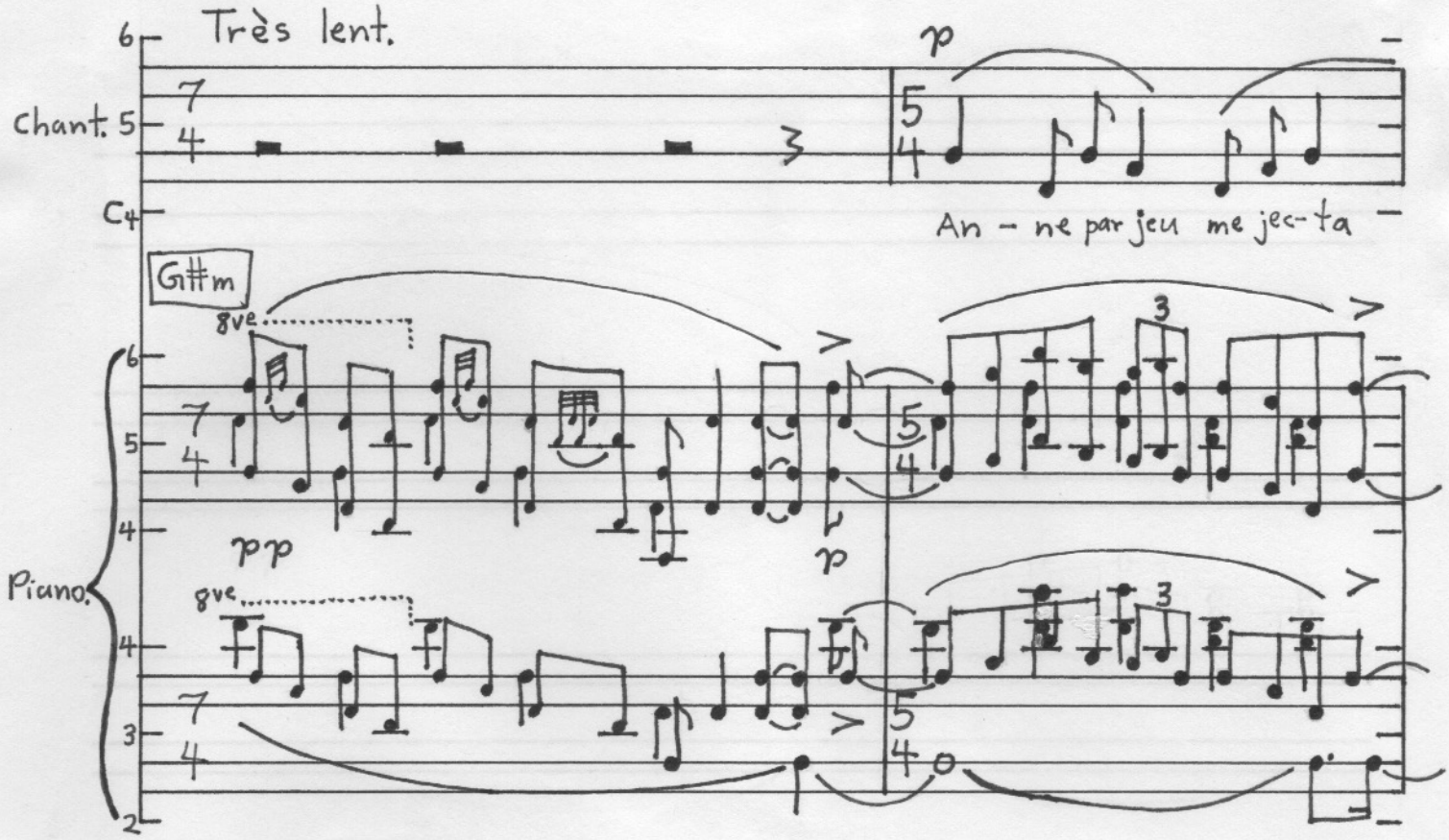
G♯m

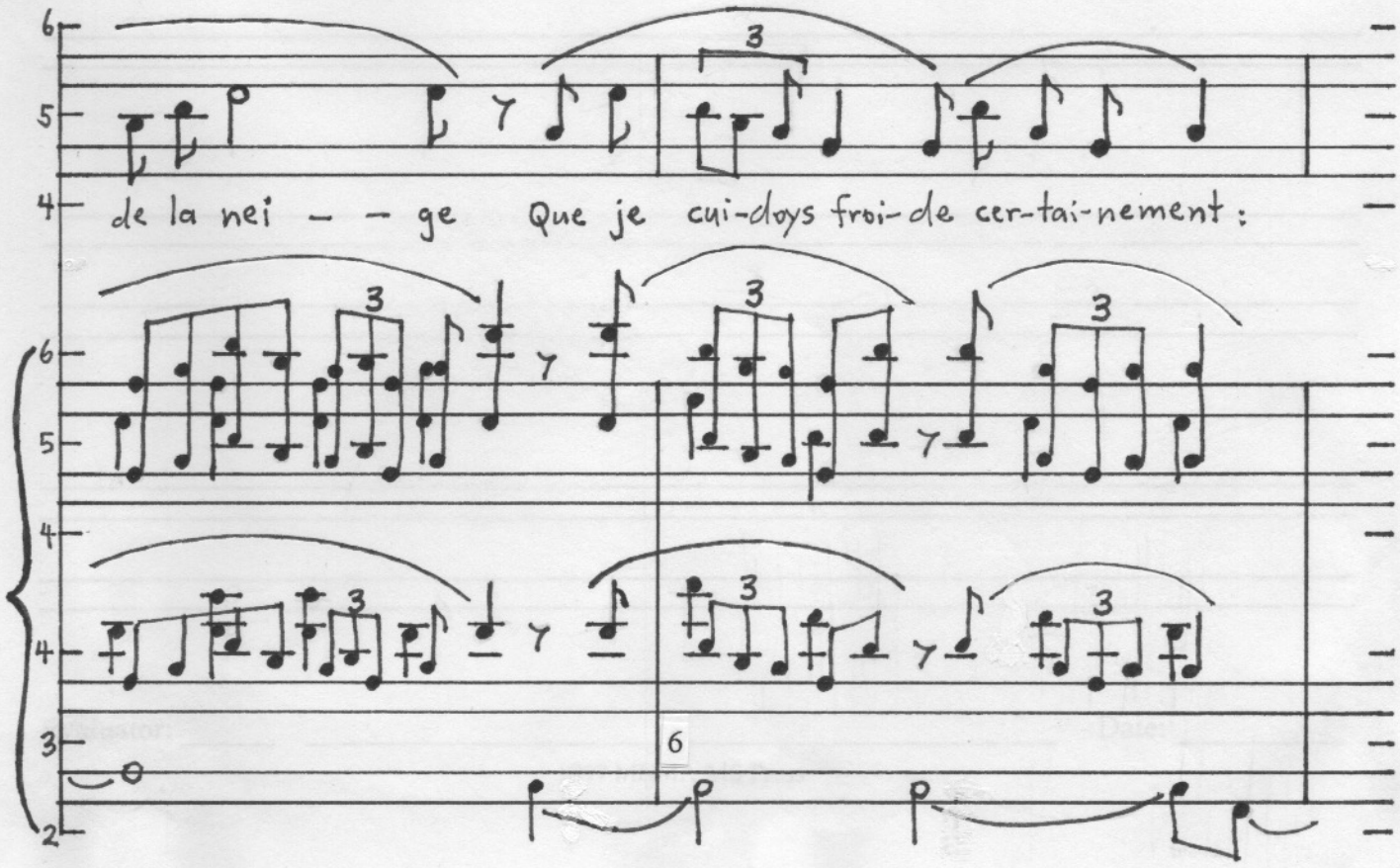
An - ne par jeu me jec-ta

Piano.

de la nei - - ge Que je cui-doys froi - de - cer-tai-nement

The 'revised' diatonic pattern has certain superior ergonomic features for the group of diatonic staff configurations, advantages similar in nature to the *double twin-line* for chromatic proportional staves. Interestingly enough, both of them base their architecture on a common pattern, shown on diagram **a** above. Whereas this 'nexus' represents a tritone in the chromatic *double twin-line*, for the diatonic staff it represents 'almost an octave.' Our fortunate member should properly be called the *diatonic double twin-line* or the *diatonic twin-line* for short. The dual-octave symmetry of its architecture is also amenable to the use of a color-strip to highlight the central lines (diagram **b** above). Ideally it should be a pale gray or some similar light color. I was somewhat disappointed that the traditional diatonic staff (and its close variants) was not given consideration as an option within the 37 proposals. In order to compare the spacial layout of the proportional 12mm. chromatic model with the 8mm. diatonic approach, I have notated the Ravel segment using the 8mm. *diatonic twin-line* staff configuration. Compare the readability between this diatonic alternative and the three 'proportional best,' especially the 2-phase *double twin-line* version. To my mind, the advantages of the *diatonic twin-line* layout consist of more than just the savings in paper weight.

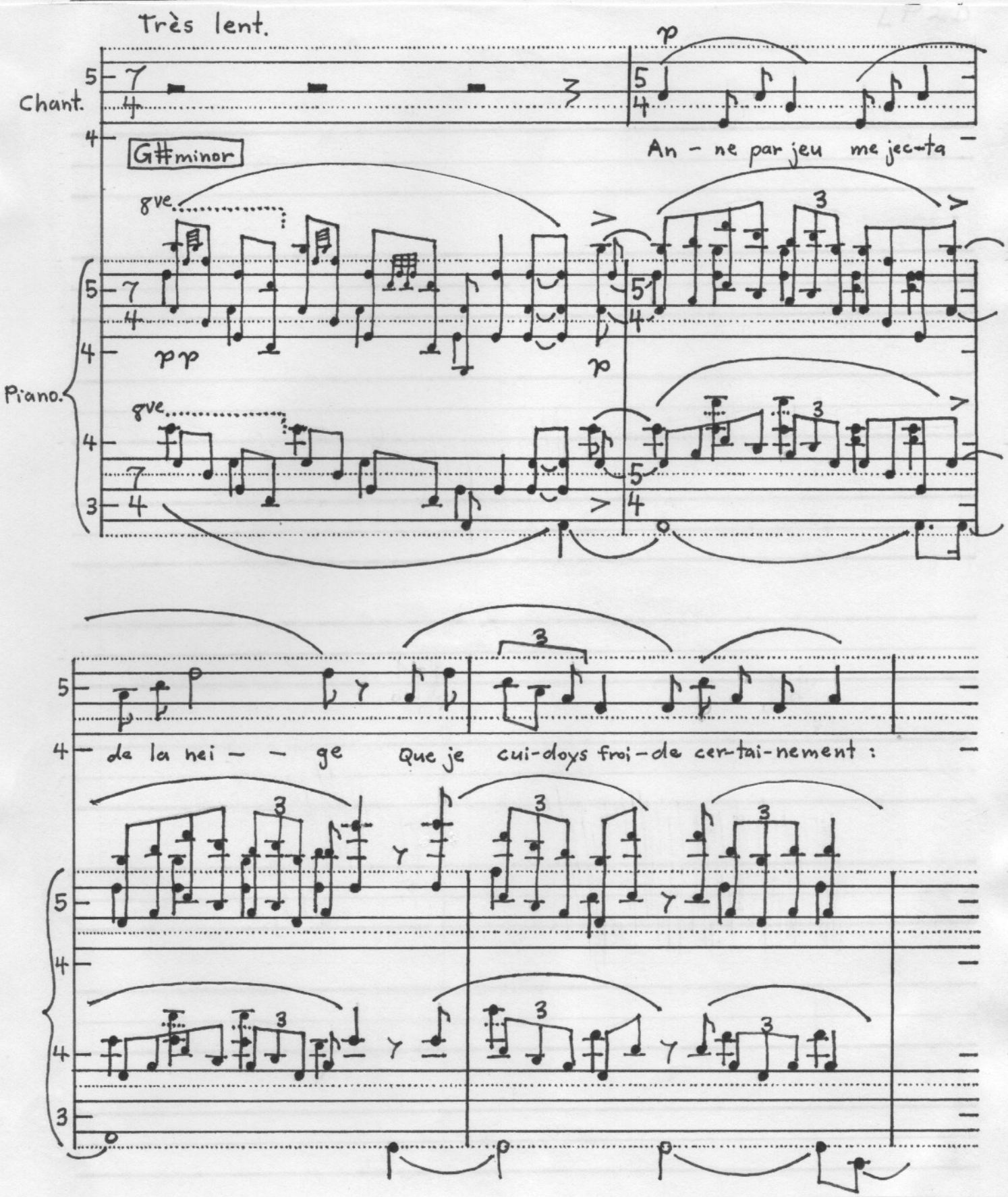

Très lent.
Chant.
C4
G#m
8ve
Piano
pp
p
An - ne par jeu me jec-ta


de la nei - - ge Que je cui-doys froi-de cer-tai-nement :

#2 → Tri-line

AI 311

LP2D



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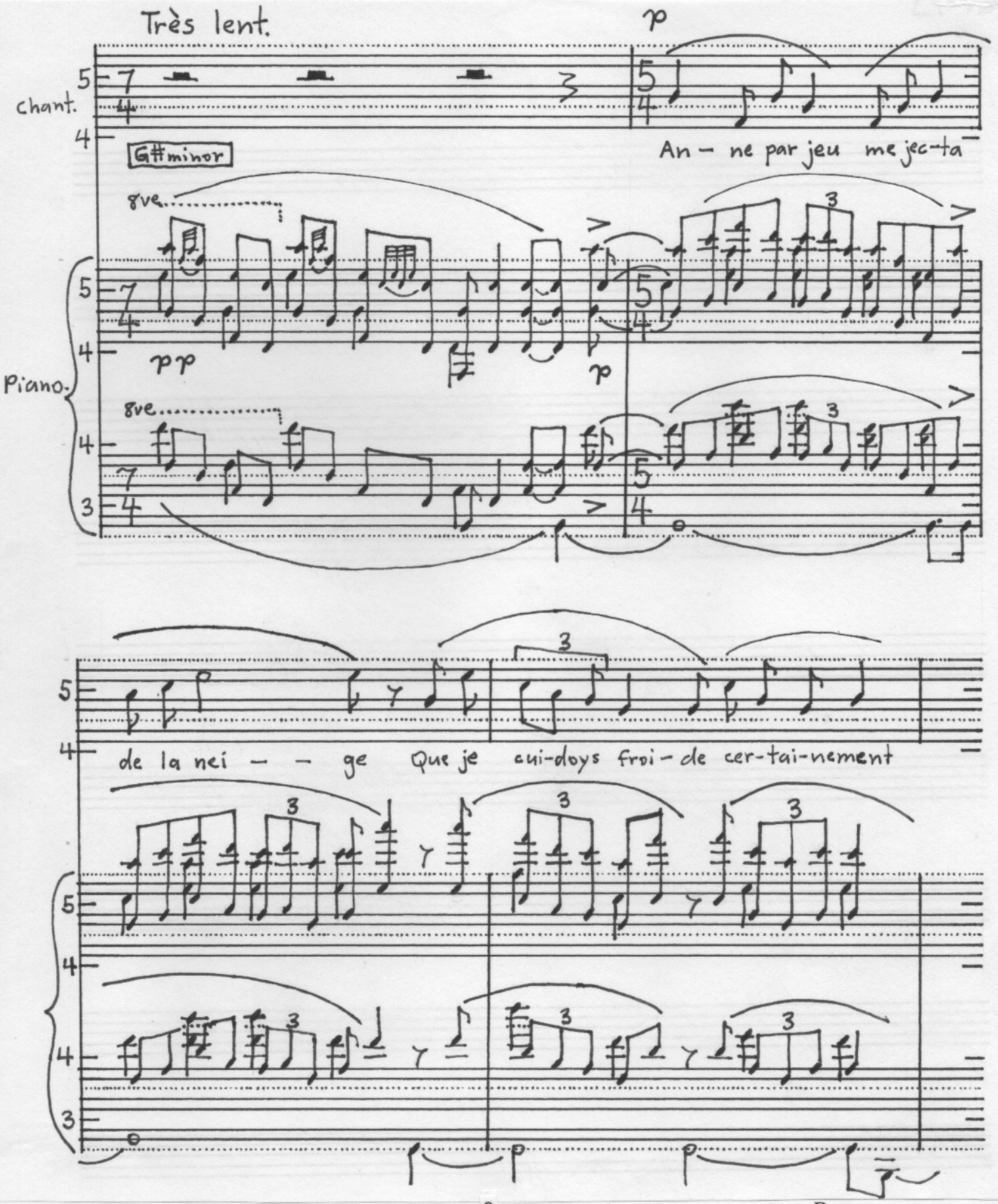
#16 → Double Twin-line



1997 MNMA MS Press

COMMENTARY ON THE TWO PROPORTIONAL 'FINALISTS'

Siemen Terpstra

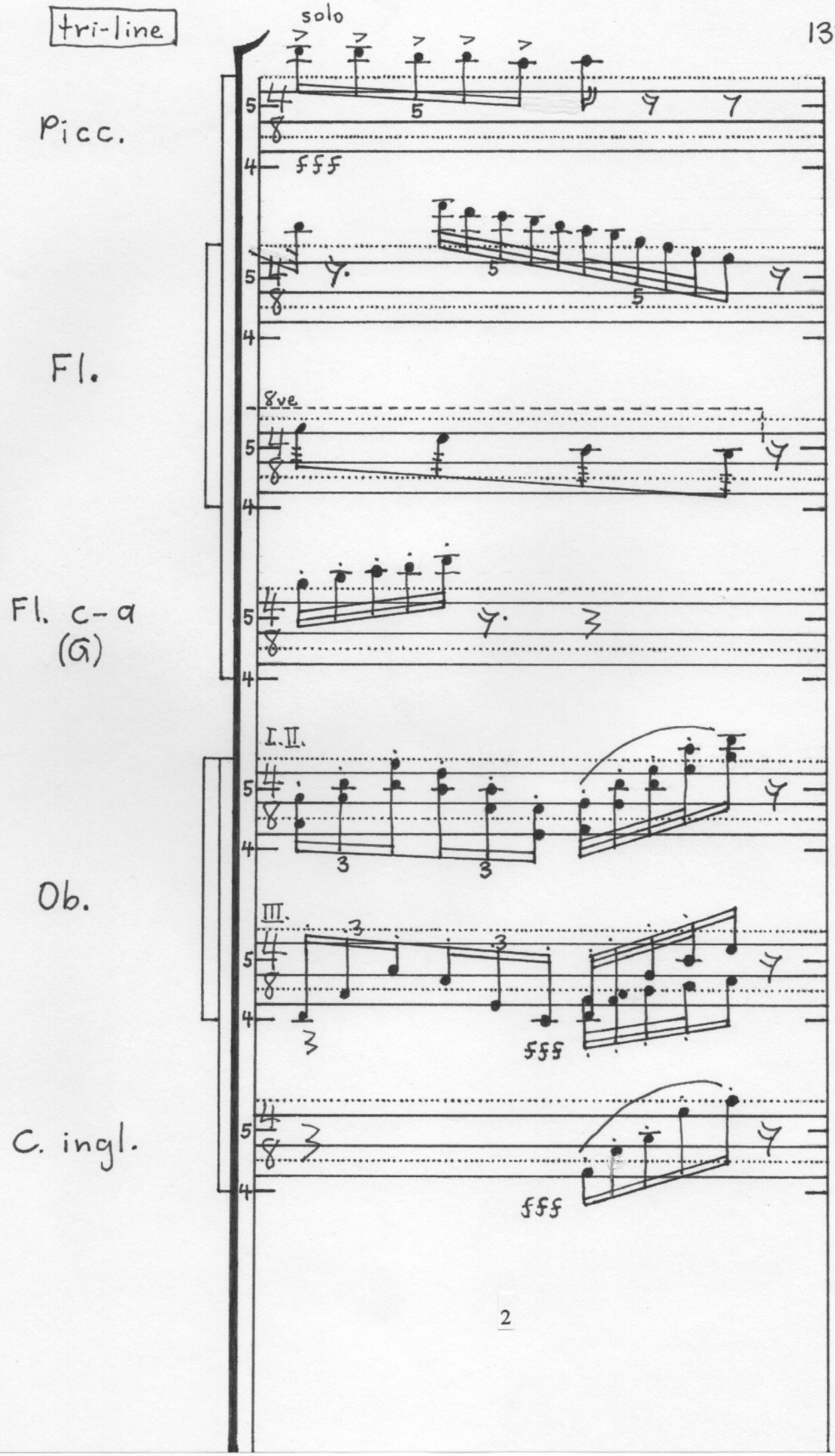
The Stravinsky orchestral score was a real challenge for the proportional ideal. I had to divide the 30 given discontinuous staves into *four pages*. It is here that we witness the drawbacks of enlarged staves in their most acute form. In order to appreciate the true 'immensity' of the material, the four pages should be taped together vertically as a proper score. Even when the line spacing is reduced below 2mm. to form a 'pocket score' format, the layout is still to my mind, grossly inflated.

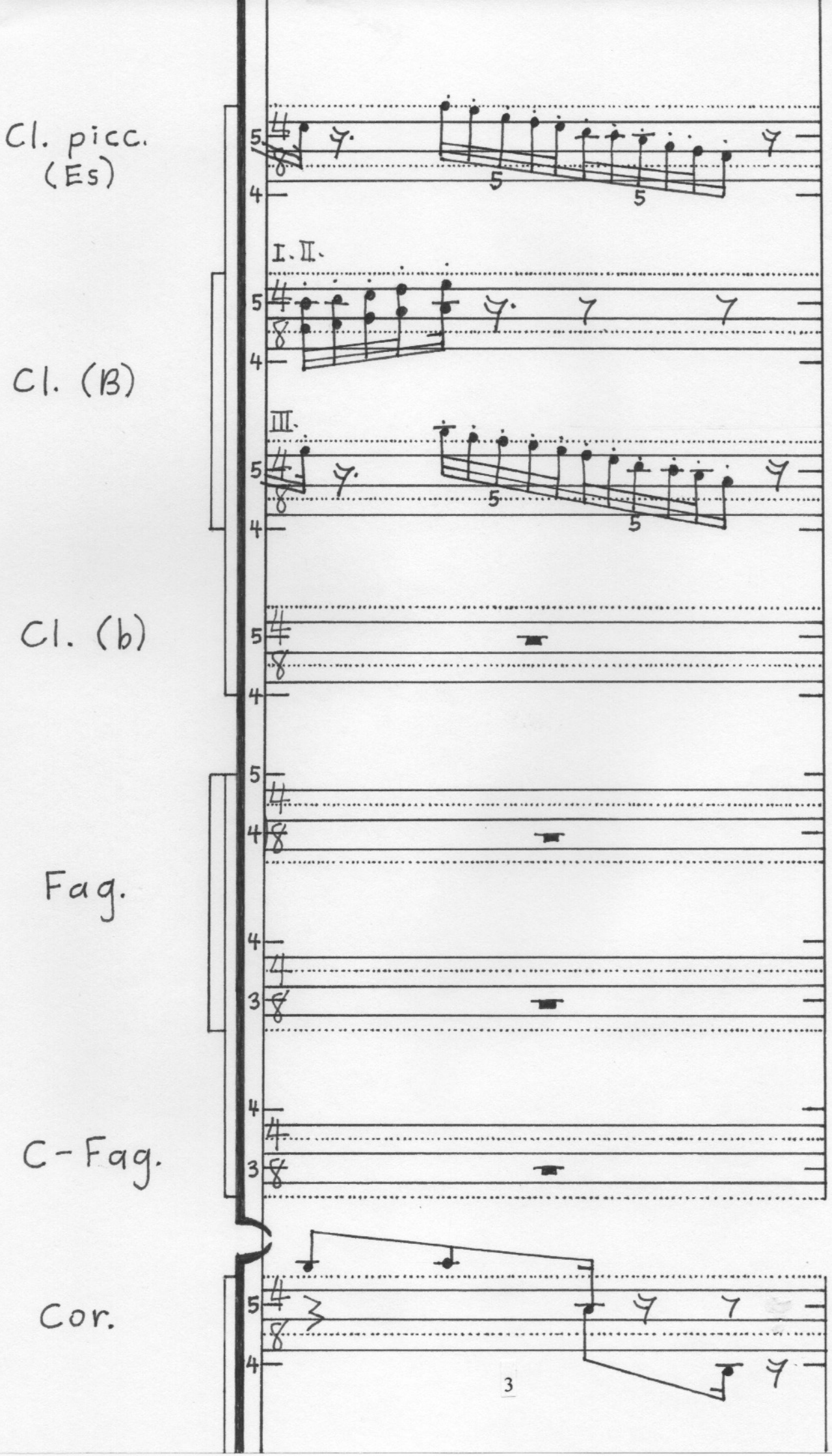
I have employed the standard 2mm. line spacing and also 'squeezed' the staves as close as possible to each other, in order to maximize my count per page. The chosen maximum was eight per page. Two pages have seven staves, so divided where best appropriate in order to preserve the natural boundaries between orchestral forces. Experimenting with the spacing of the staves from each other, I found that I could get nine onto a page, even ten, but then they are really too close to each other. We must not forget that these proportional staves need numerous ledger lines. More ledger lines require more 'elbow room.' My chosen density of eight per page is already on the edge. Ledger lines may occasionally 'bleed over' onto the adjacent staff. I tried to do the best I could in the difficult compromise between the need for maximum density and the opposite need for adequate space in which to house the copious ledger lines.

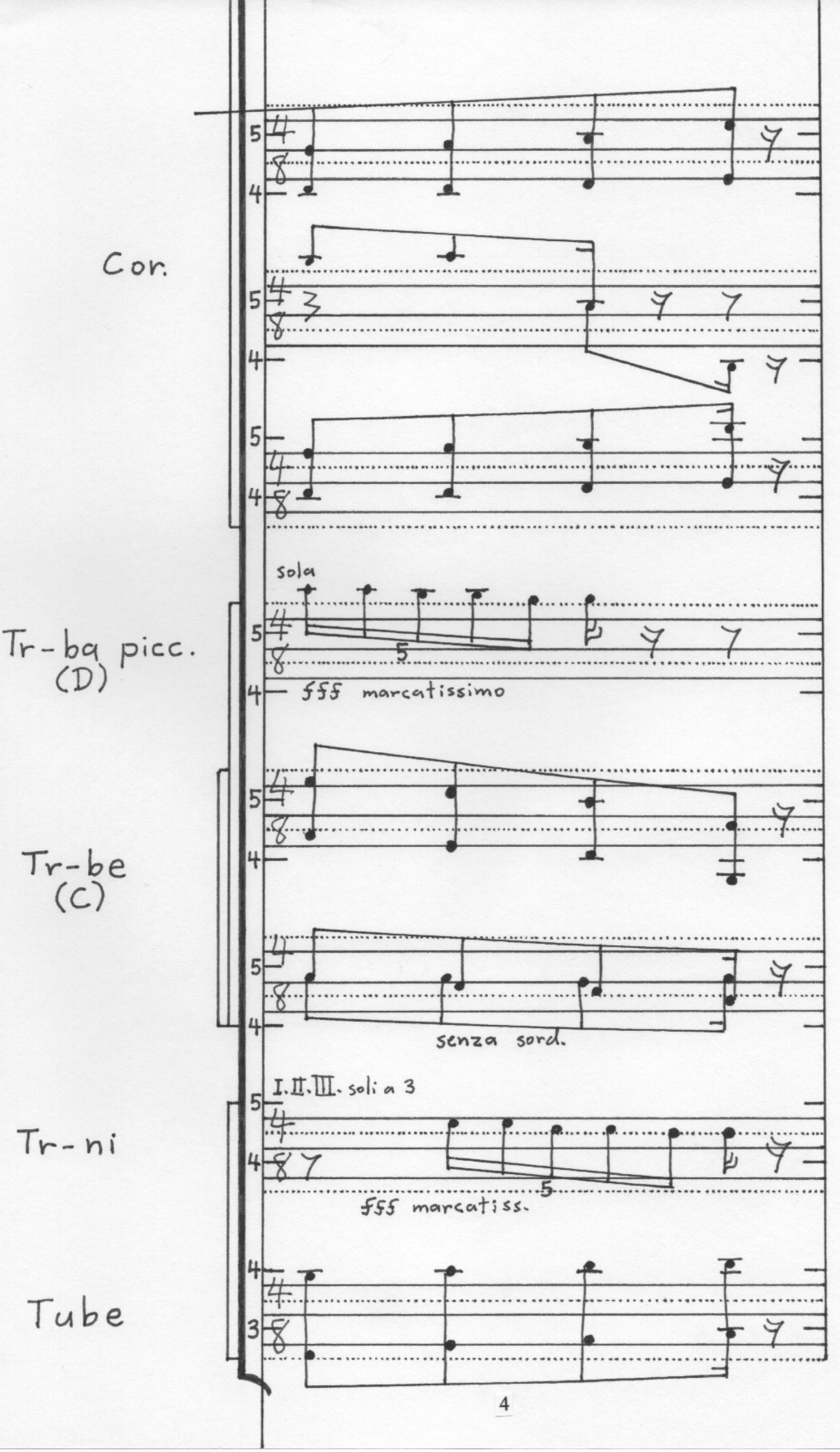
Due to the exuberant rhythmic complexity of the musical score, I found it necessary to use a graphic underlay in order to line up the four main divisions of the bar. However, I have refrained from using a strictly proportional layout of durations.

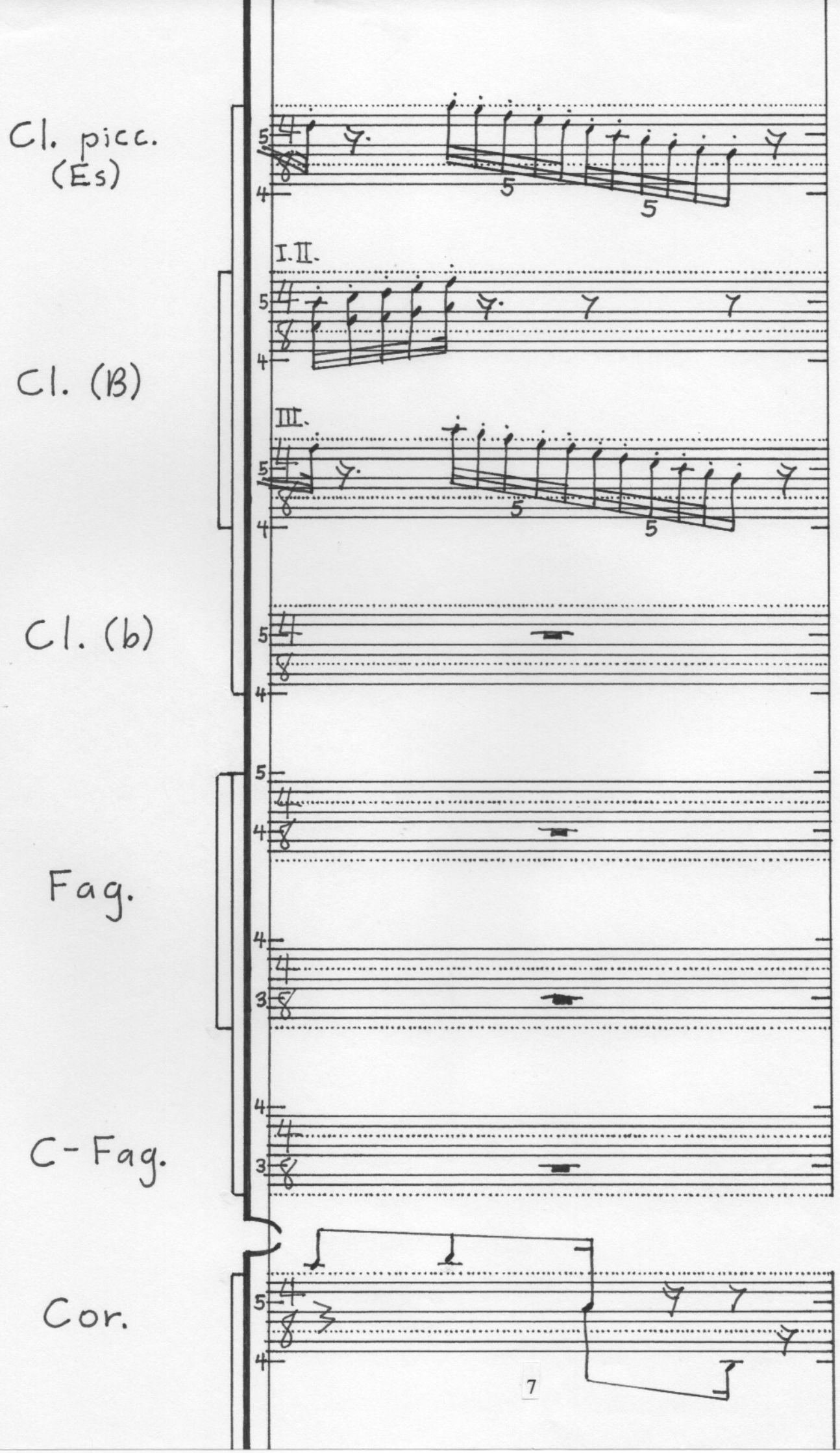
As usual in this 'winnowing' process, I must eliminate one of these two notations so that we can establish a winner in this 'contest.' The loser here must be the *tri-line*, even though personally I have no real preference between them. The *double twin-line* has the edge because it is easier to read only lines and spaces than it is lines and 'oriented' spaces (touching above and below). The *tri-line* staff requires this added complexity in the perceptual requirements. The second reason that I have chosen the *double twin-line* over the *tri-line* concerns notehead shapes. The *tri-line* favors (almost needs) round noteheads to make position maximally clear. The *double twin-line* does not have this handicap. Its faster-to-write oval noteheads are useable even when they thin out almost to lines. This is a distinct practical advantage when writing at speed. For these reasons I am compelled to favor the *double twin-line* over the *tri-line* approach in the final analysis.

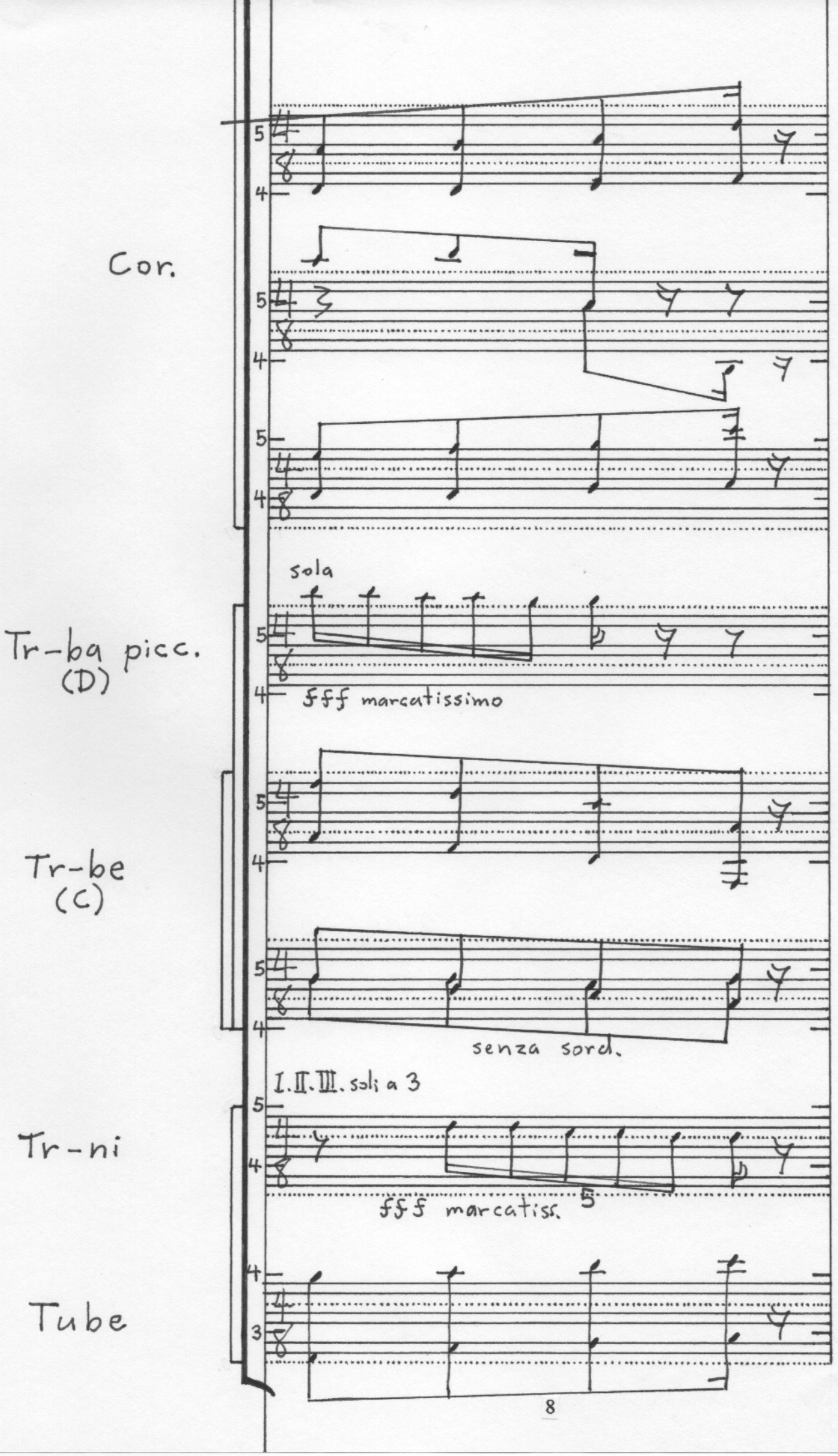
All three of the proportional 'ideals' (*twin-line*, *tri-line*, and *double twin-line*) exhibit the same fatal flaw. The 'information' is so spread out that it becomes difficult to scan the whole 'territory' in an integrated fashion. It feels so 'scattered out' and abstract, like stellar solitudes distant from each other. The melodic contours are magnified, exaggerated, and exhibit a strange sort of vertigo. The ledger lines proliferate. And these are the *best* of the proportional layouts! This orchestral score was a challenge—not because the notation is difficult to write, but rather because the results show up the impracticality of the 'big spread' in such a glaring manner.

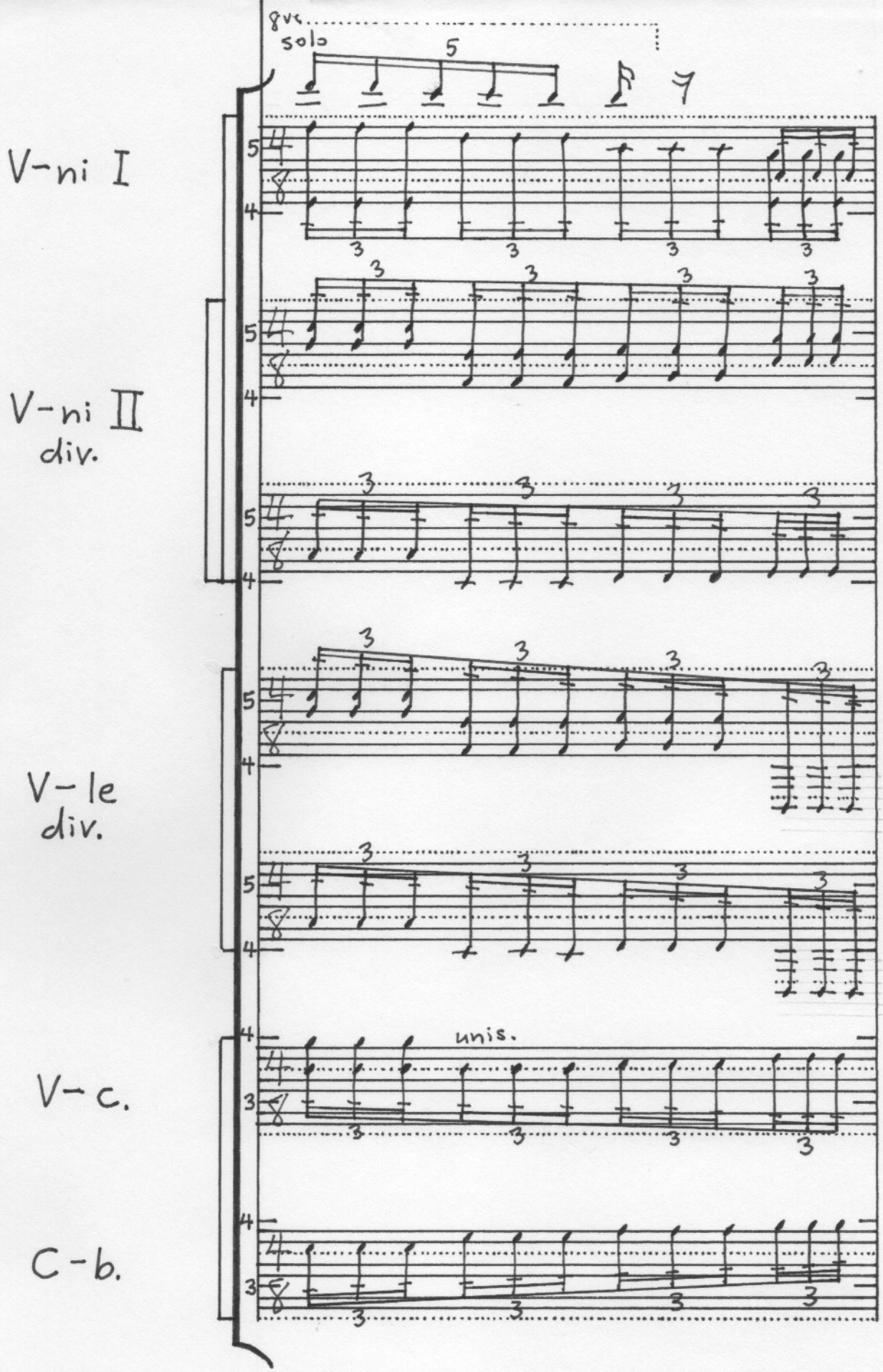

solo
Picc.
fff
Fl.
8ve
Fl. c-a
(G)
I. II.
Ob.
III.
fff
C. ingl.
fff


Cl. picc.
(Es)
I. II.
Cl. (B)
III.
Cl. (b)
Fag.
C-Fag.
Cor.


Cor.
Tr-ba picc.
(D)
sola
fff marcatissimo
Tr-be
(C)
senza sord.
Tr-ni
I. II. III. soli a 3
fff marcatiss.
Tube


Cl. picc.
(Es)
I. II.
Cl. (B)
III.
Cl. (b)
Fag.
C-Fag.
Cor.


Cor.
sola
Tr-ba picc.
(D)
fff marcatissimo
Tr-be
(C)
senza sord.
I. II. III. soli a 3
Tr-ni
fff marcatiss.
Tube


8va
solo
V-ni I
V-ni II
div.
V-le
div.
V-c.
unis.
C-b.

EVALUATOR'S SUMMARY AND CONCLUSIONS

Siemen Terpstra

This process of evaluation has been a real journey of discovery for me. My intention all along has been to find the most practical version of a proportional layout. The 37 proposals on offer each had various problems to which I had to respond. Naturally, I was compelled to suggest amendments to these proposals in order to improve the proportional model. At first these amendments were only minor variations, but gradually I was moved to redesign staff configurations in a more substantial manner.

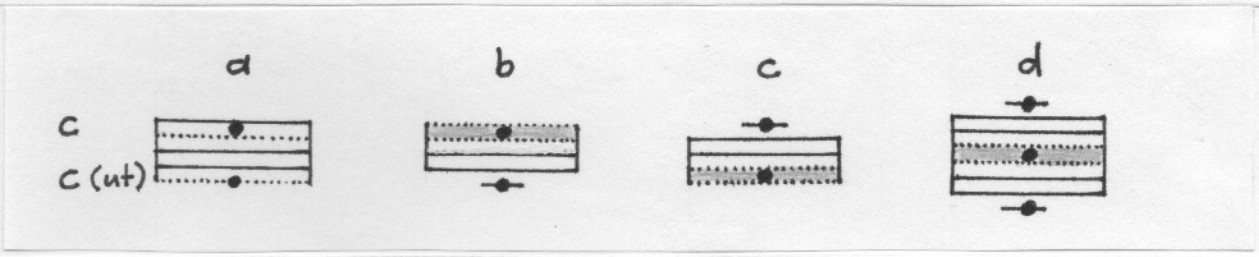
Only a minor change to the 5-line pentagram staff of #16 to #24 yielded the *double twin-line*, which undoubtedly has superior characteristics. I was surprised that no one before me had considered this most fortunate option. A more original creative input was required in order to transform #2 into the *tri-line* configuration. Here I have more-or-less invented an entirely new proportional approach. The given *twin-line* option was the best possibility amongst the 4-phase notations. To a certain extent, the solid 'logic' of the proportional *twin-line* was an inspiration for me to find a similar 'best' option for the 3-phase and 2-phase layouts.

The exploration of alternative staff configurations in the first report was mainly a systematic effort to consider the various possibilities and to justify my choice of a 'best' option. I wanted to show that the decision was not entirely arbitrary and 'out of the blue.' The result of this investigation was the establishment of the 12mm. octave proportional staves in their three optimal forms—always assuming the desirability of proportionality. Out of these three, the 2-phase *double twin-line* seemed the best alternative for various practical reasons.

The more I worked with the chromatic proportional staves, the more I came to appreciate the traditional diatonic notation, in spite of its well-known faults. The overriding problem with the proportional layout is its need for an 'inflated' octave. This reform results in an overly 'splayed' image, it requires relearning the recognition of interval patterns, and it eats up a lot more paper than the diatonic approach. I began to question whether the various advantages accruing from a proportional chromatic notation are worth the drawbacks of the 'great expansion.'

Meanwhile, I had inadvertently discovered that the principles of pattern ergonomics that I had meticulously applied to the proportional staff layouts could also be applied to the non-proportional diatonic staff. The progeny of this investigation was the *diatonic twin-line* layout, a markedly improved version of the traditional notation. Such variants of the diatonic staff were not included in the survey, and I felt somewhat at a loss over how to deal with them. Should they even be considered here when our prime focus is proportionality?

Yet the *diatonic twin-line* fulfils many of the requirements that had originally justified the proportional layouts. Again, I was surprised that no one in the past had hit upon this solution. I have the firm conviction that little is ever really new in the field of music notation (like musical tuning!). Consequently, after formulating the *diatonic twin-line*, I leafed through Gardner Read's book to see if anyone else had already considered it. Apparently not, but I *did* find a 'forerunner' of sorts in the fanciful 'tri-colored staff' of Cornier (1856). If we ignore his tri-colors and other absurdities, then his staff (which covers only one octave) has the pattern shown below on diagram **a**. This configuration is conceivably related to **b** and (less directly) to **c**. Patterns **b** and **c**, of course, form the subset octave 'modules' of the *diatonic twin-line* (**d**). Searching through the literature, pattern **a** is the closest historical 'ancestor' of this interesting staff configuration. It appears that that I have indeed invented a new staff configuration here.



PROPORTIONALITY ON TRIAL

The *diatonic twin-line* has enough laudable features to enable it to compete well with the proportional *double twin-line*. It is worthwhile here to do a little comparison between these two, so that we can judge whether the advantages of proportionality are really worth the costs. In order to assess the comparative potential of these two options, we will use the 'ten primary criteria' of worth by Raymondi (1843) found in Read (page 4).

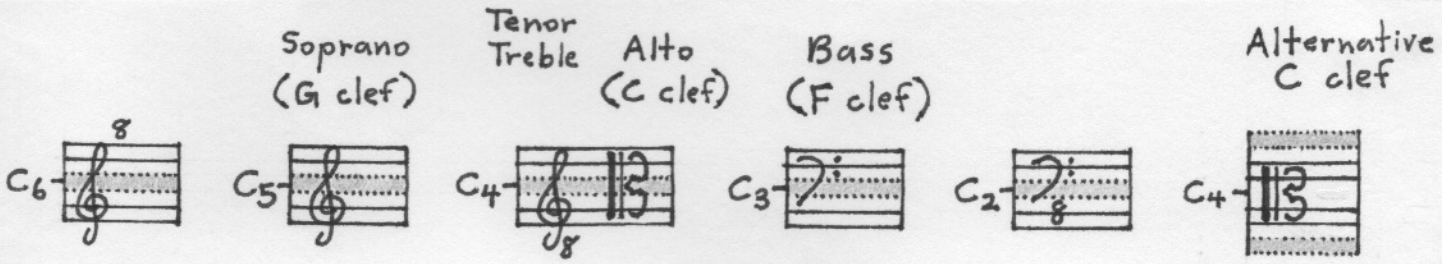
1. To make clearer the function of the staff lines and spaces.
Both the *double twin-line* and the *diatonic twin-line* excel in this matter. Indeed, the main focus in my investigation of alternative staff configurations has been to improve readability through a clearer (less abstract) staff layout. The neighborhoods of the scale are more explicitly articulated. The reason for this success is simple. We need only two lines (rather than five or eight or whatever) before we enter a 'special zone' (ledger line, dotted line, colored strip). Consequently, it becomes easier to see where one is in the scale.

2. *To obviate the need for ledger lines, thus keeping all the notes on the staff.*
In this matter the *diatonic twin-line* is quite superior to the *double twin-line*. It is simply impossible to eliminate ledger lines altogether on a discontinuous staff, but the *diatonic twin-line* at least reduces them by adding a line and increasing its span to almost two octaves. On the other hand, the *double twin-line* and its proportional cousins have a serious problem in this regard. Due to their 'blotted' layout we witness a natural tendency to reduce the span of the discontinuous staff to only one octave. But this move dooms it to the need for *even more* ledger lines, since even the most minor of instruments has a two-octave range and many have double that. Yet if the proportional staff is instead

expanded to a two octaves span in order to eliminate more ledger lines, then it takes up far too much space. For this reason I decided to keep the range of the chromatic staff at about one and a half octaves (like the standard staff). Imagine how much space the Stravinsky excerpt would have needed if I had used the full double-octave staff. Concerning the issue of ledger lines, the proportional staff deteriorates the traditional notation, while the *diatonic twin-line* moderately improves it.

3. *To make all octaves have the same relationship to the staff.*
The *double twin-line* has the edge here, since the pattern is truly octave-invariant. Meanwhile, for the *diatonic twin-line* the pattern is double-octave-invariant. Although definitely not as desirable, it is still almost as good and a marked improvement over the standard pentagram staff.

4. *To abolish the profusion of clef signs.*
Since the *double twin-line* is octave-invariant, one need only mark in the register (C4, C5, etc,) and then any alternative clef signs become redundant. Every register has the same pattern. However, the *diatonic twin-line* also accomplishes this aim by taking advantage of its double-octave invariance. It conveniently employs the same staff layout for most of the traditional clef signs, as illustrated in the diagram below.



Only the *tenor clef* is an exception, for which an adjustment can be made, and at any rate the expanded range of the staff reduces the need for it. The *C clef* can alternatively be presented with a line orientation by using the 'tessellated sister' of the *diatonic twin-line* shown to the right of the diagram. Thus the *diatonic twin-line* configuration also eliminates the need to 'reorient' the pitch layout for every clef sign. Of course, the traditional clef signs could still be used if desired, or they could be replaced by the simple register mark as we did for the proportional staves.

5. *To simplify, or abolish, the accidental signs.*
In this matter, of course, the proportional staff has the 'advantage,' since the *diatonic twin-line* preserves the traditional system of sharps and flats. Taking a historical perspective, it is no accident that the movement to abolish accidentals gathered steam during the 19th century when well-temperament was in vogue, equal-temperament was a growing ideal, and the piano had recently become the 'king' of instruments. The notation of sharps and flats had earlier been invented during the high renaissance (with an orientation around vocal music) when European culture shifted from the medieval ideal to meantone tuning in a big way. In such an environment, enharmonic distinctions are *real* and thus must be notated. But meantone tuning is not naturally restricted to twelve notes per octave. Already by the end of the 16th century many people were using roughly 19 notes per octave (that is, *both* sharps and flats), and the theorists had already found that one needs 31 notes to close the circle of fifths. Consequently, the standard keyboard

pattern (7-5) inherited from the late medieval period was ill-suited to this harmony system. A division of only twelve notes per octave is just too restrictive for the variegated and colorful meantone palette. Such a restriction also strangulated open modulation. Unfortunately, no one could think of a decent keyboard suited for its beautiful complexity—tragically, Bosanquet's excellent design came along in the later 19th century when the meantone era was long gone. One of the significant reasons that varieties of well-temperament supplanted meantone is because its harmonic architecture is perfectly suited to the 7-5 keyboard. Indeed, variations of the well-temperament approach work *only* when we restrict the octave to exactly twelve notes. During the 18th century, some musicians used varieties of meantone, some varieties of well-temperament, but in the 19th century meantone mostly disappeared, even though an impartial analysis leads to the conclusion that meantone is harmonically superior (it has greater consonance). The lack of a suitable keyboard was its downfall.

The movement to abolish accidentals is intrinsically bound up with the 7-5 keyboard and its well-temperament (and later equal-temperament) tuning. The instrument in its present design is simply incapable of enharmonic distinctions and so its players have atrophied their appreciation of them. However, most other instruments are perfectly capable of such distinctions and their colorful subtlety is one of the ongoing joys making orchestral music, string music, and vocal music interesting. Unlike fixed pitch instruments, variable pitch instruments are open to the nuances of harmony and hence need accidentals as a guide for inflections. The abolition of these fine distinctions in the notation is deleterious for most instruments, and especially for the intelligent appreciation of old music from the renaissance, baroque, classical, and romantic eras. It robs us of certain information of real value to most instruments, in return for a facile convenience for keyboards. To my reckoning, the advantage of the *diatonic twin-line* lies its very preservation of accidentals while still improving the other parameters of readability.

6. *To improve the visual aspects of duration.*
7. *To regulate the indications of measures.*
8. *To improve the notation of irregular rhythmic values.*

I have largely side-stepped rhythmic reforms in this study, partly because I see few problems in the standard approach, and partly because all of the 'improvements' presented are so bad. Strict proportionality *is* sometimes useful when notating patterns of extreme complexity, but its very *inflexibility* is its downfall. The standard approach, like the diatonic staff layout, is eminently flexible and workable.

9. *To facilitate the writing down of music.*

Neither notation system helps very much, except to make locations easier to spot. No matter what system is used, one must understand what one is writing in order to use it with facility. Any system must be learned in order to be useable.

10. *To make musical typography easier to print and to read.*

Neither system makes typography any easier, since one needs dotted lines as well as the normal lines, and the other uses a color strip. However, by this simple complication, the readability is much improved.

According to these criteria, the *diatonic twin-line* compares well with the chromatic staff. We can supplement these criteria with Karkoschka's (1972) lexicon of eight standards (Read, page 5), just to bring our criteria of worth more up to date.

1. *It should possess all the possibilities of traditional notation.*

Both notations pass this test, but the *double twin-line* only accommodates traditional accidentals with some awkwardness. The *diatonic twin-line* is more flexible, like the traditional staff.

2. *It should not go against tradition without good reason.*

The *diatonic twin-line* is superior is this regard, since one does not need to 'unlearn' the familiar interval spacing and chord shapes. The proportional notations constitute too radical a shift in this regard.

3. *It should have enough new technical possibilities to be able to represent the present stage of musical thinking.*

Neither system adequately represents the awesome challenges presented by the 'New Complexity,' but for most purposes they are fine. Nowadays, complex processes can be programmed by machines, rhythms so convoluted that they are extremely difficult to notate. But for most music, the standard system works admirably.

4. *It should be capable of presenting complicated structures in a simpler form than does present day notation.*

In this regard, neither system helps much. I question whether the simplification of complexity is always the best approach to ergonomics. Valuable information can be lost. Sometimes complexity is best handled through maximizing flexibility.

5. *It should have a broad, neutral basis and avoid, if possible, representing any particular style.*

Both systems do this well.

6. *It should make easier the transition to individual notation forms, e.g. approximate values and musical graphs.*

The jury's out on which is better, but the *diatonic twin-line* is so close to the standard notation that it would be more appropriate as an inter-system standard. We should be able to translate systems between alternatives without too much difficulty. Everyone can thus use his or her own favorite notation.

7. *It should have no difficulty in being able to represent more than 12 values (intervals) in an octave.*

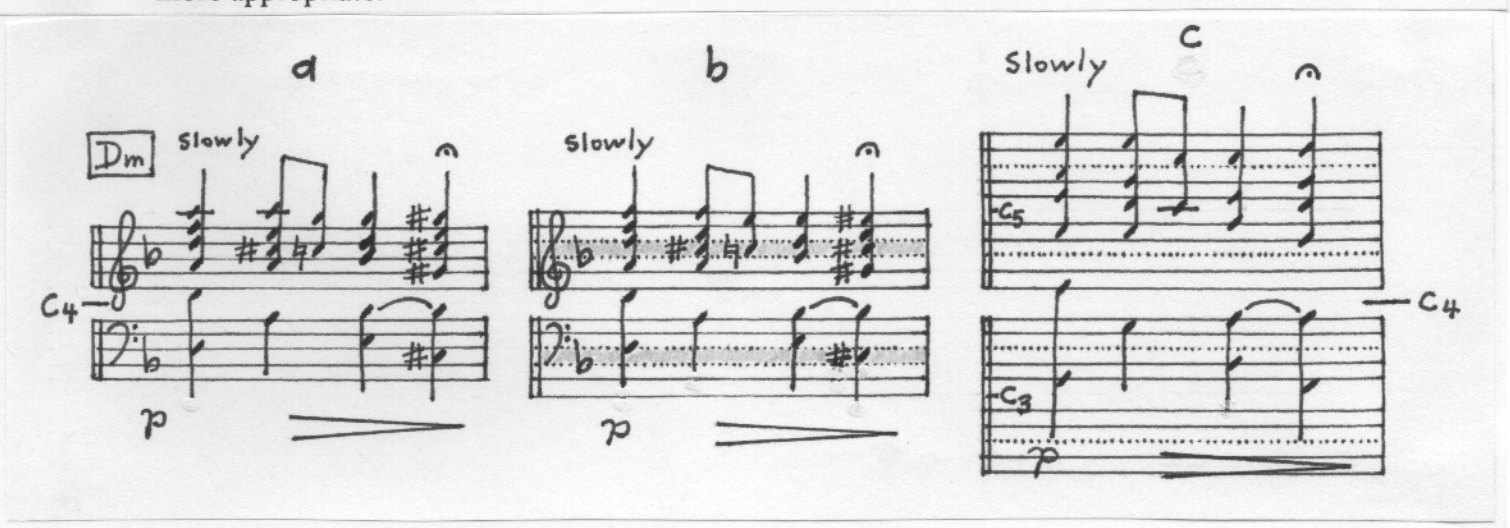
Both systems are workable for microtonality, but the *diatonic twin-line* has a definite edge here. The standard diatonic staff already *is* microtonal because it has sharps and flats.

8. *What the ear hears must be represented to the eye in such a way that two basic characteristics are taken into consideration: (a) The visual event must be apparent as the direct translation of the auditory event, requiring as few additional thought processes as possible and (b) the individual symbols and the totality of symbols must be formed on an optical basis; they must be "correct" in the visual-psychological sense.*

These factors are hard to judge, but the diatonic system scores more highly in its visual impact. The proportional staff is spacially 'overweight' and the melodic contours are unfamiliar, like a lunar landscape. The diatonic staff is, of course, familiar and aesthetically pleasing. The 'spaciness' of the proportional staff is not only a result of unfamiliarity. The design itself is partly to blame.

In summary, the best of the proportional staves has very few real advantages over the *diatonic twin-line*. Its main 'claim to fame' is its celebrated abolition of accidentals, but this is a dubious distinction largely of value mainly to keyboard players. In order to achieve this abolition the notation has needed a layout which is too 'fragmented,' obliterating the familiar traditional interval spaces and requiring many ledger lines. As far as I am concerned, the *cost is too high* for such a doubtful and ambiguous gain.

In order to illustrate the attendant 'damage' to practicality associated with the 'big spread,' here is a snippet of music (notated on a grand staff) using the standard layout (**a**), the *diatonic twin-line* (**b**), and the *double twin-line* (**c**). While the *diatonic twin-line* preserves the essential characteristics of the traditional notation, with all of its flexibility and relative compactness, the *double twin-line* 'expands' the parameters in such a way that it is now barely feasible. Also, subtle musical cues are lost. Specifically, a sensitive group of string players will *not* play the two last chords as if they form the same harmonic structure (a minor sixth tetrad). While the proportional notion glibly shows the move from Bb to G# as a simple whole-step, the diatonic notation reminds us that it is actually intended to be a 'stretched' whole-step. Sensitive players who may have no theoretical understanding of the complex architecture of harmony nevertheless tend to 'intuit' the proper inflection which is, of course, lost on a piano. The notation gives helpful clues to the proper inflections. Especially for vocal music, the old notation is more appropriate.



The abolition of sharp and flat signs is hardly worth such a major disruption in the notation. In my estimation, the disadvantages of proportionality outweigh the advantages. And so, for me, enough of chromatic notations, with their reductionist, tablature-loving logic. Give me the sensible diatonic staff with its aesthetic appeal, its richness of information and its flexibility. Give me the *diatonic twin-line*, the most ergonomically fortunate orientation to emerge from this evaluator's reflections over the last three months. Give me a staff that maintains our links to the high historical European music culture.

And here my evaluation concludes. I must admit that I was not very much 'taken' by any of the 37 proposals as practical improvements over the standard staff. Yet they *were* quite interesting. Some of them certainly merit kudos for high inventiveness. Numbers #36 and #37 were aesthetically beautiful. The *twin-line* 'altered-notehead' designs of De Vries and Reed were visually stunning. The group of proposals that featured the *twin-line* displayed a certain 'logic' in their layout. It guided me along a path to the formulation of the other proportional 'ideals.' To a large extent, the *tri-line* and *double twin-line* layouts are merely extensions of the same ergonomics that I had found in the given *twin-line* configuration. Although I have suggested a number of (likely) original designs in this evaluation, these findings would have been impossible without the solid foundation provided by my predecessors. Even the non-proportional *diatonic twin-line* could only surface once I had digested the intriguing 'family sets' amongst proportional staves. When I began this critical survey, I had no idea that I would eventually present something like the *diatonic twin-line*; indeed, I had no idea of its existence. It demonstrates the value in tackling such a sampling of possibilities—focusing the mind. I can hardly wait to read the reports of the other evaluators! Who knows what further gems have been unearthed?!

-August 3, 1999 in Amsterdam, Europe